Fall 2002

U.S. Coast Guard

Systems Times

Working Today to Challenge Tomorrow

The Yard

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U. S. Coast Guard Systems Times

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Articles should be about 500 words long; however, C4 and engineering specific articles can be up to 2,000 words. To have your article considered for publication, photo(s) must accompany each article. Articles can be submitted by FedEx in hard copy and/or in Microsoft Word on a 3.5 disk or e-mailed electronically. Please submit original photographs and graphics. All slides, photos, graphics and illustrations should be in color where possible. Let us know if you want your photos and graphics returned to you. Submit inquiries, letters, articles and photographs to:

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Fall 2003 - 03 July 2003

On the Covers: Waiting repairs under the Coast Guard's 110' Hull Sustainment Project, Coast Guard Cutter FARLLON (front cover) docks on the YARD's shiplift next to the Cutter DALLAS (back cover).

What's Inside?

Special Feature:

The Coast Guard YARD
A Pictorial History

Page CG YARD 1
(Center of Issue)

Correction: In the Summer 2002 issue of the *Systems Times,* EO is spelled out as Engineering Officer throughout the issue. EO should read Engineer Officer as per USCG Regulations Manual, COMDT M5000.3(series), chapter 6, part 5. This was in error by the editor ... yours truly.

Greetings,

and welcome to the Fall 2002 issue of *Systems Times*! This is the first issue to be published since I reported as Assistant Commandant for Systems in June. I'm looking forward to this opportunity to serve as your Chief Engineer as we move ahead with many exciting changes.

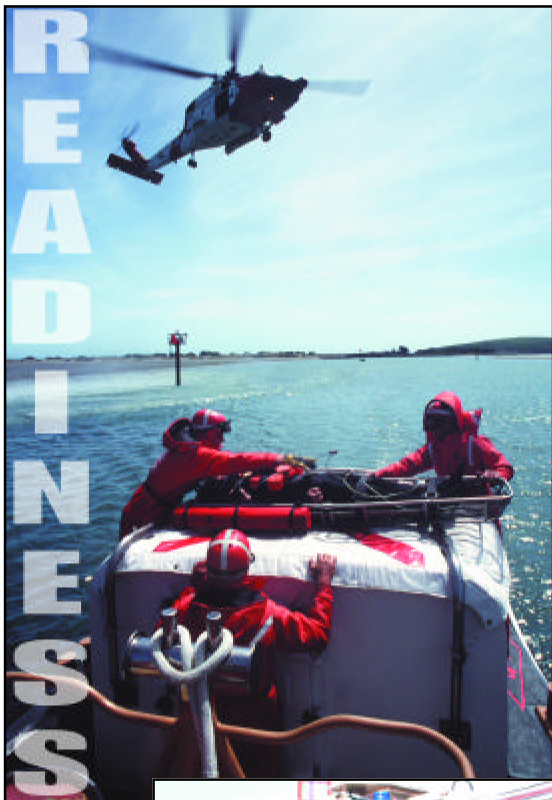
This issue features a pictorial history of the Coast Guard YARD: "103 Years of Service to the Fleet." As I reviewed the article before going to press, I was again reminded of the tremendous impact our shipyard has had upon the Coast Guard since its establishment in 1899. The YARD has built, renovated or repaired nearly every cutter commissioned since then! As we begin the 21st century, the Coast Guard YARD continues to provide strategic value to our Service and the nation. I know that through this issue of the *Systems Times*, you will enjoy a deeper appreciation for the rich history of our shipyard.

Looking ahead, the Coast Guard is poised at the brink of the most exciting era in our 212-year history. In the coming years, we will implement the Deepwater System as well as the National Distress and Response System (NDRS). In addition, it's very likely that by this time next year we will be playing a major role as a member of the new Department of Homeland Security. The thrilling element of these changes is that each of us will have a hand shaping the future of the Coast Guard and the service we provide to this great nation. We have the opportunity to "get it right" by helping to forge new, maintainable systems that are built upon solid support strategies.

This summer Admiral Collins issued the Commandant's Direction, which focuses on **Readiness**, **People** and **Stewardship**. I am pleased to report that our concentration on restoring readiness is beginning to pay off. Increases in the funding levels of the AFC-41, 42, 43 and 45 accounts, in conjunction with Deepwater implementation, hold great promise in the coming years. We should soon see better maintenance and noteworthy modernization of our shore facilities, electronic systems, aircraft, cutters and boats. On the people side, we continue to work closely with the Assistant Commandant for Human Resources on his Future Force 21 initiative to develop a more flexible human resource system that will bring relief to the shortages of officers and enlisted personnel.

These next few years will be very exciting, as together we shape the future of Systems and the Coast Guard … Semper Paratus!

James A. Kinghorn, RADM, USCG
Assistant Commandant for Systems
“Chief Engineer”



Shipboard Command and Control System SCCS-378
(C2CEN)

The Command and Control Engineering Center (C2CEN) and the Coast Guard (CG) YARD installed the SCCS-378 Baseline Version 2.0 prototype aboard CGC DALLAS in April 2002. CGC DALLAS utilized the new system during their most recent deployment. CGC DALLAS' crew and C2CEN riders have been evaluating the new system and providing valuable feedback for improvements. This new system integrates tactical graphics, electronic navigation (COMmand Display and Control Integrated Navigation System (COMDAC INS)), secure tactical data and desktop messaging. It also provides the flexibility to place navigation and tactical graphics where it is needed most for a mission. Graphical information is also available to the Commanding Officer in the CO's stateroom. Incorporation of new STATus NETwork (STAT-NET) software is the first step in the long road to removal of the AN/SPS-25 consoles. Regular installations are scheduled to begin in 2nd QTR FY03 (Fiscal Year 2003) with installations approximately every 60 days, cutter and CG YARD schedules permitting. Complete roll out of the new system will take 18 to 24 months.

C2CEN will continue to support Baseline Version 1.1.3 during the installation of the new system. Field changes to upgrade the TAC-3 tape drives to DDS-3, installation of a back up Local Area Network (LAN) switch and soft copy of system documentation is anticipated to be issued by September 2002. SCCS-378 Point of Contact is LT Thomas Linke at (757) 686-2179.

Shipboard Command and Control System SCCS-270
(C2CEN)

The current baseline is 1.0.1. The Command and Control Engineering Center (C2CEN) is developing Field Change 2 during FY02 (Fiscal Year 2002) to add a second Central Processing Unit (CPU) and increase memory in each computer. Field Change 2 will improve system overall performance allowing for faster loading of charts and radar overlays. If FY03 funding is approved, replacements for the Data Converter Unit (DCU) will begin in FY03. SCCS-270 Point of Contact is LT Thomas Linke at (757) 686-2179.

Shipboard Command and Control System SCCS-210
(C2CEN)

Field Change 2 (FC2) was approved and released on 27 February 2002. This upgrades the system baseline to version 1.2.2. FC2 adds a second Central Processing Unit (CPU), doubles the hard drive capacity and more than doubles the memory increasing the system's performance. The Command and Control Engineering Center (C2CEN) has received extremely positive feedback from field units regarding this field change. C2CEN has identified a possible replacement for the North Stabilization Kit (NSK) that will eliminate data integrity problems that were inherent to the NSK. If FY03 (Fiscal Year 2003) funding is received, C2CEN anticipates beginning to field these replacement units during FY03. SCCS-210 Point of Contact is LT Thomas Linke at (757) 686-2179.

WLB/WLM Integrated Shipboard Control System (ISCS) Support (C2CEN)

Classroom Improvements: The instructors at the Command and Control Engineering Center (C2CEN) are adding to their arsenal of training equipment. A new teaching aid to assist in the instruction of the Dynamic Positioning System (DPS) and its relationship to Electronic Chart Precise Integrated Navigation System (ECPINS) is being built in Salt Lake City, Utah by GlobalSim Corporation. The new classroom equipment will be known as the DTS, short for the DPS Training System. It will simulate the interaction of the DPS and ECPINS systems providing students a sophisticated presentation on the intricacies of ship handling and maneuvering with the electronic equipment installed in the U.S. Coast Guard's modern buoy tender fleet.

New Buoy Tender Sensors: There is a project underway to install the Raytheon CRP-V850 shallow-water depth sounder on the WLM (coastal) and the WLB (seagoing) buoy tenders. The installation of a replacement deep-water depth sounder is ongoing aboard WLB buoy tenders. The Sperry SRD-500 Doppler Speed Log is under investigation as a replacement for installed equipment on the WLM and the WLB buoy tenders. These installations will affect the configuration of the Adaptable Fiber-optic Embedded Local Area Network (SAFENET LAN) routing table and the Electronic Chart Precise Integrated Navigation System (ECPINS) sensor configuration.

WLB/WLM ISCS Point of Contact is Mr. Robert Feather at (757) 686-2123.

49' BUSL Electronic Charting System (ECS) (C2CEN)

During 2001, the BUSL (Buoy Utility Stern Loading) Project Manager replaced the current Electronic Charting System (ECS), Mariners Eye, with the Computer Aided Practical Navigator (CAPN) Voyager ECS. This change was designed to bring the BUSLs in line with the rest of the Coast Guard fleet, which is currently running the CAPN Voyager program. CAPN Voyager provides the functionality offered in the Mariners Eye program, but with the additional capability to enter Search and Rescue (SAR) search patterns. C2CEN has added the ability to develop and display search patterns on CAPN Voyager without modifying the COTS software. This was done by developing a scaled down version of SAR Tools from the Command and Control Personal Computer (C2PC) along with an import utility program. Some initial installations of the CAPN encountered problems with the existing Opto-Isolator. C2CEN performed testing and identified corrective action. C2CEN purchased and shipped new Opto-Isolators for all 49' BUSL units for installation during mid-summer 2002. ECS Point of Contact is LT Ralph Benhart at (757) 686-2188.

Flight Deck Closed Circuit Television (FD CCTV) (C2CEN)

The Command and Control Engineering Center (C2CEN) has prototyped replacement pan/tilts and control heads on 210', 270', 378' and Polar class cutters with favorable results. Data from the prototype installations is being used to develop kits for all classes of cutters. It has not been determined who will purchase, assemble and disseminate these replacement kits. The goal of these installations is to standardize the four cutter classes and make FD CCTV equipment more supportable in the long term. Presently, 270s are the only class of cutter that has had all replacement equipment installed and standardized.

In conjunction with the FD CCTV project, C2CEN is also eliminating the need for the unsupportable DynAir video switching system. The Flight Deck upgrade with the Shipboard Command and Control System (SCCS) 378 upgrade will bypass the DynAir switch and will utilize the RADDS panel and the STATus NETwork (STATNET) panel for easy and convenient video switching and viewing.

The use of a Digital Video Recorder (DVR) as part of the flight deck system will be prototyped. Existing time-lapse recorders require extensive maintenance as they age; good video quality also requires that the tapes be discarded after re-recording no more than ten times. Digital video recorders eliminate these system deficiencies. FD CCTV Point of Contact is Mr. Steve Farthing at (757) 686-4284.

Maritime Forward Looking Infrared (MARFLIR) (C2CEN)

All 25 WHEC (high endurance) and WMEC (medium endurance) cutters are outfitted with MARFLIR now. The system continues to receive positive comments from the fleet. Using part of the $4 million appropriated by Congress for the purchase of additional Electro-Optic/InfraRed (EO/IR) systems, Coast Guard Headquarters (CGHQ) is preparing a Military Interdepartmental Purchase Request (MIPR) to fund the purchase of the last five options on the existing MARFLIR contract. Once procured, two or three systems will be installed on 110'/87' cutters and the balance used as spares. Tentative installation dates are early in Calender Year 2003. The balance of the funding will be used to procure nine additional EO/IR systems on a new contract administered by NAVSEA Crane. This will be a competitive bid contract and could result in the procurement of more MARFLIR systems, or the procurement of a similar system from another vendor. Additionally, the upgraded prototype gimbal arrived at NAVSEA Crane in June 2002. This gimbal contains the new Sony color daylight camera, which replaces the current black and white model. In addition, the Hand Control Unit will be modified to allow the operator to independently power on/off the thermal imager. This should result in extended life for the thermal imager's cryogenic cooler. After testing and performance benchmarking, Coast Guard representatives will travel to NAVSEA Crane to inspect the prototype.

In early May of this year, two WESCAM Model 12 EO-IR systems were installed on board Coast Guard Cutter (CGC) MONHEGAN (110') and CGC GANNET (87'). These systems were removed from T-AGOS class cutters before their sale to the National Oceanic and Atmospheric Administration (NOAA) a few years back. Both systems were inspected at NAVSEA Crane and were returned to WESCAM for repairs and software upgrades before installation. The system came with only the gimbal and hand controller; therefore NAVSEA Crane procured a flat-screen Liquid Crystal Display (LCD) and fabricated two prototype cables in their cable shop. Unlike MARFLIR, all electronics are contained inside the gimbal and there is no separate “processor box.” Also unlike MARFLIR, the system has no track function, and due to the cost associated with the addition of this feature it probably won't be pursued. The installation on CGC MONHEGAN went as planned, until a defect was discovered in the power supply board within the LCD display. This was subsequently repaired by the Original Equipment Manufacturer (OEM) (on both units), which returned the system to full working order. The installation on board CGC GANNET did not go as smoothly, however. Significant Electro-Magnetic Interference (EMI) was encountered when the system was first powered on and on all future attempts. After much trial-and-error, the source of the EMI was finally narrowed down to either the prototype cable or gimbal. After discussions between the ship and CGHQ, the installation team decided to remove the gimbal and send it back to NAVSEA Crane for further troubleshooting. Under direction from CGHQ, NAVSEA Crane is currently building another cable more suited for permanent installation, rather than a temporary prototype effort. This cable will be used to troubleshoot the source of the interference. If the existing cable is determined to be good, the gimbal will be returned to the OEM for additional repair.

MARFLIR Point of Contact is Mr. Mark Stanley at (757) 686-4156.

AN/SPS-73 Surface Search Radar (C2CEN)

With the exception of the three remaining 87' CPBs, AN/SPS-73 radar installations are complete. The current software version is 10.0.1, and the latest field change is Field Change 3. The Coast Guard awarded a contract to Raytheon Electronic Systems (RES) in late May 2002 for development of software version

10.3. This build addresses 13 issues, most notably further improvements to the nighttime menu, a less aggressive Sensitivity Time Constant (STC) and tracker enhancements. The majority of the items were generated from suggestions included in the quarterly Surface Search Radar (SSR) feedback reports submitted by field units. Testing on selected platforms began in August 2002 with release to the field taking place during the first quarter of Fiscal Year 2003.

During the last six months, the Command and Control Engineering Center (C2CEN) technicians conducted several "AN/SPS-73 Road Shows" at Electronic Support Units and large Electronic Support Detachments. Technicians from shore units and cutters were trained to operate and repair the radar. Feedback has been positive, and if funding allows, we will conduct more training next fiscal year.

If you have any questions concerning C2CEN's AN/SPS-73 Surface Search Radar project, please contact LT Bob Manning at (757) 686-2141 or C2CEN's Help Desk at (757) 686-2156.

Navigation Sensors (C2CEN)

The Command and Control Engineering Center (C2CEN) is the System Management Engineering Facility (SMEF) for Navigation Sensors. We provide "last stop" technical assistance for corrective maintenance issues beyond the capabilities of field technicians, Electronic Support Units and Electronic Support Detachments. SMEF responsibilities include resolving System Trouble Reports (STRs), System Improvement Reports (SIRs), Engineering Change Proposals (ECPs), field change development and overall system engineering.

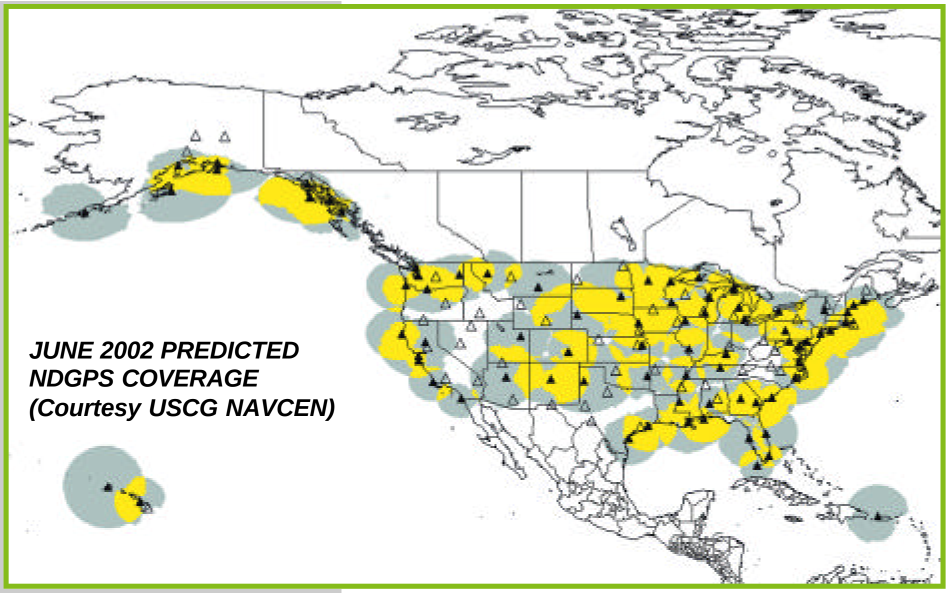
In Fiscal Year 2003, approximately one-hundred 41' Utility Boats (UTBs) will receive a Small Boat Integrated Navigation System (SINS) that includes a combination radar chart plotter with a color display, Differential Global Positioning System (DGPS) receiver, depth sounder and fluxgate compass. The SINS package replaces the AN/SPS-69 radar, CMX-MX-200 GPS receiver, CMX-MX-51R DGPS receiver and CFAZ-ST-50 depth sounder. This equipment will be refurbished and placed back in the support pipeline at the Engineering Logistics Center (ELC) Baltimore. Two SINS prototypes were installed on UTB Systems Center Yorktown's 41' UTBs in December and are being evaluated by students and instructors.

The Trimble CEPY-NT300D DGPS receiver will replace the CMX-MX-200 and CMX-MX-51R receivers on Shipboard Command and Control System (SCCS) equipped cutters. This includes all WHEC-378s (High Endurance Cutter), WMEC-270s (Medium Endurance Cutter), WMEC-210s, and Coast Guard Cutter (CGC) ALEX HALEY. The CEPY-NT300D DGPS receivers were released to WHEC-378 cutters in June 2002, but release to WMEC-270 and -210 cutters is on hold until INMARSAT interference problems are corrected.

If you have any questions concerning C2CEN's Navigation Sensor project, please contact LT Bob Manning at (757) 686-2141 or C2CEN's Help Desk at (757) 686-2156.

Nationwide/Maritime Differential Global Positioning System (N/DGPS) (C2CEN)

The Nationwide Differential GPS (NDGPS) expansion project continues to increase signal coverage throughout the U.S. Twenty-three NDGPS sites are now on air, supplementing the existing Maritime DGPS sites for a total of 80 transmitting broadcast sites. The upcoming months will show the same steady progress, as additional sites will be brought on-air. These sites include a new construction site in Angleton, Texas, to replace the Galveston, Texas site; a new site construction in Pahoa, Hawaii; and a U.S. Air Force Ground Wave Emergency Network (GWEN) conversion to a NDGPS site in Medora. Three to five additional sites are in preliminary planning for Fiscal Year 2002 (FY02) completion. The present Continental United States (CONUS) predicted coverage map is shown below with single coverage areas in gray and double coverage



JUNE 2002 PREDICTED NDGPS COVERAGE (Courtesy USCG NAVCEN)

areas in yellow.

The Command and Control Engineering Center (C2CEN) continues to work with equipment manufacturers and field units to implement several recently issued field changes (FC) to improve the overall availability and reliability of the N/DGPS service. These field changes include: FC11, which improves the maritime antenna system; FC12, which upgrades the DGPS reference station power supply; FC13, which improves the firmware of the DGPS reference station and integrity monitor to better track satellite performance and reduce the effect of satellite anomalies; and FC14/15, which upgrades the DGPS automatic tuning unit.

C2CEN continues to improve the NDGPS infrastructure with additional engineering projects including, but not limited to: fully inclusive MF radiator, ground, icing, and lightning protection studies to determine the ideal DGPS antenna configuration; a Wide-Area Network (WAN) upgrade from the present X.25 communications to a more supportable, robust Frame Relay network; development of a Remote Transmitter Control Interface (RTCI) for the NDGPS GWEN transmitter to allow the Nationwide Control Station (NCS) to interface directly; and a SC1000 battery charger upgrade.

N/DGPS Point of Contact is Mr. Dave Wolfe at (757) 686-4015.

Nationwide Control Station

(C2CEN)

First phase installation of the Nationwide DGPS Control Station (NCS) Version 2.3.1 was completed in early June 2002 at the Navigation Centers (East and West). Nine operational sites and five engineering/mockup sites were monitored/controlled by watchstanders for 4-6 weeks prior to complete system transition in late July 2002. With the capability to simultaneously monitor and control at least 200 DGPS broadcast sites, NCS culminates a 3-year $1.7M development effort at the Command and Control Engineering Center (C2CEN). All functionality of the CONSTA (R1.10) system has been ported to NCS. New features of note include site and system availability analysis and failure tracking reporting. Built to be Wide-Area Network (WAN) independent, NCS is staged to accept sites as they are transitioned form the current X.25 WAN to the Frame Relay WAN.

System requirements have been captured and managed using Telelogic's Dynamic Object Oriented Requirements System (DOORS). Microsoft NT 4.0/SP 6.A (server and workstation) is the Operating System, and Oracle 8i Enterprise Edition provides data storage/management and reporting capabilities. Developed using Microsoft's Visual C++ suite, code configuration management is accomplished using Merant's PVCS. The server platform is comprised of dual Dell 6450 Power Edge 4-processor computers, each having a 12-drive array of 18-GB disk drives. Client workstations are dual-processor Dell Precision Workstation 530s. Cisco's 3640 routers and 2924XL Switches provide network connectivity.

The client-server design minimizes and/or eliminates single points of failure and provides fault tolerant data storage. Features of note include the mirrored servers, redundant power supplies and processors within each server, redundant SCSI buses, controllers and cables, and Redundant Array of Inexpensive Disks (RAID) disk configuration. To provide contingency fail-over capabilities, the system relies on Legato's Co-StandbyServer™ to manage hardware and software failures.

The Server portion of the application performs system Monitoring including all network communications and data storage. The Client performs the control functions, providing a User Interface (UI) for watchstander-initiated changes and System Status and Information display. The UI also provides watchstanders the capability to change site parameters and disable sites, i.e., turn off corrections, as circumstances warrant.

NCS is installed at the two operational sites, Coast Guard Navigation Center in Alexandria, Virginia, and Coast Guard Navigation Center Detachment in Petaluma, California. C2CEN also maintains engineering and support baselines at its Portsmouth, Virginia location. Each suite has the capability to monitor and control the entire system.

Future enhancements will include a data warehouse for long-term system performance trend analysis. NCS Point of Contact is Connie Judy at (757) 686-4053.

Tender Deployable DGPS System (CG/PSN-1) (C2CEN)

Requirements-based testing concluded with positive results. Range of the VHF link was determined to be 10-13 miles with moderate terrain masking. The system received approval for fielding from the Command and Control Engineering Center's (C2CEN's) Local Configuration Control Board (LCCB) 31 May 2002. There are currently three production models for fielding and a baseline unit that will be retained by C2CEN for support purposes. Final documentation work continues. The first production unit was fielded in Hawaii aboard CGC KUKUI in August 2002. Second and third units will follow in Guam and Alaska shortly thereafter. Tender Deployable DGPS Point of Contact is LT Parsons at (757) 686-4076.

Short Range Aids to Navigation (SRAN) (C2CEN)

The U.S. Coast Guard Research and Development Center gave a demonstration of fuel cell power at Cape Henry Light on 15 May 2002. Fuel cells work by converting environmental friendly fuels into Direct Current in a fuel cell stack. The fuel, which is normally a mixture of methanol and water, is super heated and forced in the system to separate into free electrons, water and heat. The free electrons are then available between an anode and cathode to produce direct current. The Cape Henry Light demonstration device will be moved to a remote lighthouse in the Delaware River sometime in Fiscal Year 2003 (FY03) to continue tests.

The Command and Control Engineering Center (C2CEN) continues development and testing of the Range Light Controller system. Funding has been approved to begin construction of the Beta test site on the Delaware and Chesapeake Canal at Elk River. This site will use Xenon Day Range Lights to aid shipping that is transiting the canal.

The VM100 Field Change 3 (FC3) and FC4 issue were begun in the fourth quarter of FY02. FC3 consists of depot installed hardware and software changes which improve functionality and reliability of the CEVV-VM100. Equipment modifications include a new Microprocessor circuit card assembly, upgraded firmware, new high voltage power supply and environmental improvements to the fog detector housing. The Engineering Logistics Center (ELC) Baltimore started installation of FC3 on depot stock in March 2002. Aids to Navigation/Engineering Support Detachment/Engineering Support Unit (ATON/ESD/ESU) units are currently receiving FC3 Depot modified VM100 fog detectors, once installed, all failed unit replacements are to be ordered from the ELC. FC4 consists of replacing the existing VM100 fog detector with a FC3 modified VM100. FC4 also provides revised installation procedures and technical documentation for proper installation, grounding and weatherproofing of the electronics assembly. All ATON/ESU/ESD electronics providers will be notified of delivery schedules in Systems Maintenance and Engineering Facility (SMEF) advisories. C2CEN requests that turn around time for replacement of field units be kept at a minimum, and units that are replaced are returned expeditiously to ELC Lab 02L. SRAN Point of Contact is Mr. Michael Zemaitis at (757) 686-2153.

Vessel Traffic Service (VTS) (C2CEN)

Over the last few months the Command and Control Engineering Center (C2CEN) Vessel Traffic Service engineering and support personnel de-installed the last three AN/SPS-64 radar systems in the U.S. Coast Guard. The radar re-capitalization of Yerba Buena Island, California; Governor's Island, New York; and Mariner's Harbor, New York, removed the last of these maintenance intensive systems. AN/SPS-64 systems were replaced by the more easily maintained AN/SPS-73 radar system.

CGVTS released a software upgrade in August of 2002, CGVTS 4.5.3. This patch fixes numerous reported software problems and provides improvements to the Vessel Maintenance Form. VTS Point of Contact is LCDR Amy Kritz at (757) 686-4287.

Homeland Security (C2CEN)

The Command and Control Engineering Center (C2CEN) Vessel Traffic Service (VTS) personnel installed and are supporting a prototype Joint Harbor Monitoring System (JHOC) consisting of radars, cameras and CGVTS software. The JHOC is manned by both Naval and Coast Guard personnel, providing vessel monitoring and tracking ability, to improve harbor security for the Hampton Roads, Virginia, area. C2CEN's Homeland Security Point of Contact is LCDR Amy Kritz at (757) 686-4287.

CG Vessel Monitoring System (VMS) (C2CEN)

The National Marine Fisheries Service (NMFS) requires fishing vessels that meet certain criteria, such as those participating in a designated fishery, to regularly report their position and other amplifying information. Currently, NMFS operates three regional VMS systems as separate applications. Each region forwards the fishing vessel track data to the Coast Guard (CG) by various means including e-mail. The system requires too much human intervention and takes too much time. The National CG-VMS, sponsored by the Office of Command and Control Architecture (G-OCC) and being developed by the Command and Control Engineering Center, will provide enhanced Maritime Domain Awareness by contributing to a common operating picture for CG units engaged in fisheries law enforcement and search and rescue operations. NMFS is nearly finished with implementing a national system. Each NMFS region will transition to this new system. The Coast Guard has negotiated with NMFS to receive the data once it is available. CG-VMS will store and forward track information and amplifying data to CG District and Area Command Centers for display on their Command and Control Personal Computer terminals. Later planned enhancements will bring the data directly to floating CG assets.

Current CG-VMS status: VMS equipment has been ordered; most of the equipment has arrived and is being configured for deployment. CG-VMS is expected to be deployed in the August/September 2002 timeframe. VMS Point of Contact is Ms. Jean Wyllie at (757) 686-4250.

Command Centers (C2CEN)

The Command and Control Engineering Center (C2CEN), working in concert with the Office of Electronic Systems (G-SCE) and the Office of Command and Control Architecture (G-OCC), conducted a series of Command Center site surveys. These surveys occurred in early June 2002 and finished in early August 2002 at Atlantic Area/District 5, D1, D7; Gantsec; and Pacific Area/D11. They build on the 1999 Command Center study and are focused on identifying a common Command Center architecture and support philosophy. The Command Center Recapitalization Project was funded in Fiscal Year (FY) 2002, with follow-on RPs in FY03 and FY04. C2CEN's Command Center Point of Contact is LCDR Amy Kritz at (757) 686-4287.

24X7 Tech Support for C2PC (C2CEN)

The Command and Control Engineering Center (C2CEN) provides 24X7 tech support for the Coast Guard's Mission Critical Command and Control Personal Computer and Search and Rescue Tools (C2PC & SARTOOLS) Software. C2PC, the backbone for the Coast Guard's Computerized SARTOOLS, is installed at all Districts, Groups and Air Stations. Search planners can shave hours off the older method of planning and coordinating a search plan formerly performed on paper.

Mr. Christopher Hartley, of Allied Technology Group Inc., has been contracted to provide a one-stop shop for C2PC operators and Standard Workstation III (SWIII) Regional System Managers. He is also skilled in all aspects CG SWIII systems, their networks and design. He is highly skilled in the operation of C2PC and SARTOOLS applications. Mr. Hartley works daily with CG SAR School and C2CEN's engineering and testing divisions. He provides Search Planning units the necessary tools to keep this Mission Critical System up and running.

Any unit requiring assistance, please call Mr. Hartley at (757) 686-4253 (M-F 0800-1600), (757) 620-3156 (All other times) or chartley@c2cen.uscg.mil mailto:chartley@c2cen.uscg.mil. Visit C2CEN's Intranet, http://cgweb.lant.uscg.mil/c2cen/fr_in.htm, and select C2PC for the latest information on the system.

ELC Electronics Equipment Support Review 2002 (ELC)

The Engineering Logistics Center (ELC) held its second Electronics Equipment Support Review (ESR) 13-16 May 2002. This year's conference was held at the Maritime Institute of Technology in Linthicum, Maryland. Held every two years, the purpose of the ESR is to address critical Coast Guard-managed electronics equipment support problems that could have an adverse impact on the operational capability of Coast Guard units. Input is solicited from the electronics community, which forms the basis of the conference agenda. This year's conference was very productive, resulting in five Commodity Management Plans to resolve equipment issues. In addition to the issues brought from the field, the ESR provides a forum for the Centers of Excellence to discuss business practices and the future of Coast Guard electronics systems.

Although this year's conference attendees provided a good cross section from the ET community, we would like to see more participation from the deck plate level for the next conference, scheduled for 2004. We encourage cutters, Electronic Support Detachments (ESDs) and Long Range Aids to Navigation (LORAN) stations to send Petty Officers who can articulately and knowledgably represent their units' electronic equipment issues. The ELC provides funding for field unit attendees. Eight months prior to the 2004 conference a message will be send out soliciting input. Your input is critical to the success of the ESR. ELC looks forward to hosting the next ESR, and hope to see you there. For information about the May 2002 ESR, contact CWO Anthony Pistillo at the ELC.

LORAN Timing and Frequency Equipment (TFE) (LSU)

The Loran Support Unit (LSU) received delivery of two prototype Timing and Frequency Equipment (TFE) suites from Timing Solutions Corp of Boulder, Colorado for first article testing and compliance checks. This marks the completion of an 8-month rapid research and development stage of the project to replace the 1970's vintage timing equipment. The TFE suite also consolidates functions of other numerous LORAN operational equipment including the Automatic Blink System, Time of Transmission Monitoring Capability, Blanking Unit and Cycle-compensation control loop. The suite functions are completely redundant with dual timers, receivers, and controllers all within one standard 19” rack.

The TFE provides improved timing functionality of steering three cesium clocks in a 'freewheel' mode or Universal Time Coordinated (UTC) from Global

Positioning System (GPS) when available. The exact transmission of a station's signal can be controlled to the cesium clocks or the external LORAN signal. This gives each LORAN station the ability to control in a Time-of-Transmission mode; a critical aspect in the future of LORAN as a backup to GPS.

First article testing is scheduled through September 2002. LSU and Timing Solutions personnel are working closely to evaluate the performance of the new timing suite and correct any discrepancies. Any questions concerning TFE may be addressed to LT Kevin Carroll at LSU, (609) 523-7204

Air Quality Video Available (MLCPAC)

Air quality regulations prohibit excessive emissions of six pollutants with negative health effects, one of which is “particulate matter.” Particulate matter is generated from many sources, but diesel exhaust is a significant source.

A typical particulate regulation is enforced by a state or local air pollution control agency, and is written in terms of opacity (the apparent density of an exhaust plume). Opacity regulations are in terms of both density and time, and typically prohibit opacities over 20% except for 3 minutes per hour.

Maintenance and Logistics Command Pacific (MLCPAC) has initiated a training program that includes a 9-minute video, directed at cutter and boat drivers. The training tape acquaints them with these limitations, and reinforces the necessity that vessels comply with them while in port or underway near the coastline. Various opacities of plumes are illustrated, and by watching the video anyone can gain a good idea of what opacity is all about. Operators are encouraged to minimize excessive warmup time for their diesel engines, and to increase the load on the engines as gradually as possible, within operational guidelines. This is somewhat similar to pilots responding to noise control requirements when taking off from an airport.

Opacity is a readily enforceable standard that requires a certified observer (smokereader) to verify the observation. The Coast Guard has had several incidents of exceeding local opacity requirements over the years, and this video should be of great assistance in reducing emissions from cutters while also cleaning up the air in their vicinity.

MLCPAC(v)’s POC is Rob Rothway.

Stand Up of G-SLI (G-S)

The Office of Logistics Systems became the Office of Logistics Information (G-SLI) on 21 June 2002. This reorganization allows G-S to develop stronger partnerships and oversight in the development of information technology processes, the integration of future Deepwater Systems and the implementation of Coast Guard Logistics Doctrine. In addition, given the various engineering disciplines (civil, aeronautical, naval, C4, industrial) and the various levels (HQ, HQ units, MLCs, MLC units) within the Coast Guard Logistics System, this reorganization provides a means to review and align logistics processes and to assess the impacts of our logistics system upon readiness. In Phase I of this organization, G-SLI teams will continue oversight of the development of the Fleet Logistics Composite Application Project and CMplus applications. As of 28 June 2002, G-SLI also assumed all oversight of the development of the Fleet Logistics System (FLS) from the Fleet Logistics Project Manager (G-AFL). In addition to these efforts, a new team will focus on Information Technology (IT) integration and coordination for G-S and begin organizational logistics data analysis and logistics processes analysis. In Phase II of the reorganization, G-SLI will consist of two teams, one focusing on IT systems integration and the other focusing on robust organizational logistics data analysis and logistics processes analysis and improvement. Migration to Phase II reorganization is anticipated upon hand-off of FLS and CMplus to sustainment and approval of additional resources to properly staff the organization. See ALCOAST 306/02 for more details. POC is CDR Wiedenhoeft, (202) 267-6918.

Fleet Logistics System (FLS) (G-S)

FLS Version 1.21, Configuration Management (CM), was rolled to production in May 2002. It marks a milestone in our vessel and electronics logistics systems, as it enables the Engineering Logistics Command (ELC) and Systems Maintenance and Engineering Facilities (SMEFs) to begin the arduous process of managing the configuration data contained in cutter CMPlus databases. Plans are still being developed to fully deploy this functionality to the ELC and SMEFs, and to create a schedule for loading cutter CMplus data, via the CMDIS extract process, to FLS. Close on the heels of Version 1.21, FLS Version 2.0 completes the maintenance management requirements for FLS, providing "work list" functionality for Maintenance and Logistics Command (MLC) subunits, and placing all Preventive Maintenance System (PMS) data within the FLS database, so that PMS can be developed, updated and distributed to CMPlus units from FLS. FLS Version 2.1 provides the ELC with improved provisioning capability, working off of the configuration data brought into FLS in Version 1.21. FLS Version 3.0 is just getting started, and seeks to retire the Accountable Item Management (AIM) application, bringing all electronics configuration and spares data within the FLS and CMPlus framework. Version 3.0 also creates an interface to Naval's Technical Information Management System, NE-TIMS. The most complex piece of FLS work falls under Increment 4, and involves the tight integration of FLS with Large Unit Financial System (LUFS) and the new Contract Information Management System (CIMS) for procurement management. This work has been ongoing for some time, and is scheduled to be ready for deployment in early Calendar Year 2003. The acting FLS Application Manager is LT Cornell Perry, (202) 543-7550, extension 209, cperry@comdt.uscg.mil.

Configuration Management Plus (CMPlus) (G-S)

CMPlus Acquisition, Construction and Improvement (AC&I) project funding was cut by 50% in Fiscal Year 2002, severely altering the course of planned development. Original plans called for the development of a CMPlus web application, and reworking the current CMPlus application to be a "forward store" version of that web application. However, due to the cuts there was insufficient funding to complete either effort. Consequently the Office of Logistics Information (G-SLI) elected to build only the supply module of CMPlus Web, and integrate that module with the existing Fleet Logistics System (FLS) maintenance and configuration modules. G-SLI also decided to upgrade the current CMPlus Progress application to a Graphical User Interface, or GUI, since it was apparent that we would need to rely on the existing application for the foreseeable future. Both efforts should be ready for deployment in early Calendar Year 2003. The CMPlus Application Manager is LT John Walthall, (202) 267-6621, jwalthall@comdt.uscg.mil.

GLIB Logistics System Support (G-S)

The Logistics Information Office partnered with the Great Lakes Icebreaker project and the Engineering Logistics Center (ELC) to provide Information Technology solutions that will improve the quality of logistics data coming from acquisition projects. Working with the Volpe Center, we developed a "New Acquisition Tool," or NAT, to facilitate the collection and correlation of logistics data needed to create a working CMplus database at cutter delivery. Further, we worked with the Supply Center Computer Replacement (SCCR) software contractor to acquire improved provisioning capability with the purchase of a commercial application known as Xventory. Xventory will allow the contractor, Project Resident Office (PRO) and the ELC to provide better spare parts provisioning at cutter delivery. See CDR Eric Linton's excellent discussion of these systems, and the business process around them, in the summer 2002 *Systems Times*.

Meet RADM James A. “Bert” Kinghorn

Assistant Commandant for Systems (G-S) “Chief Engineer”

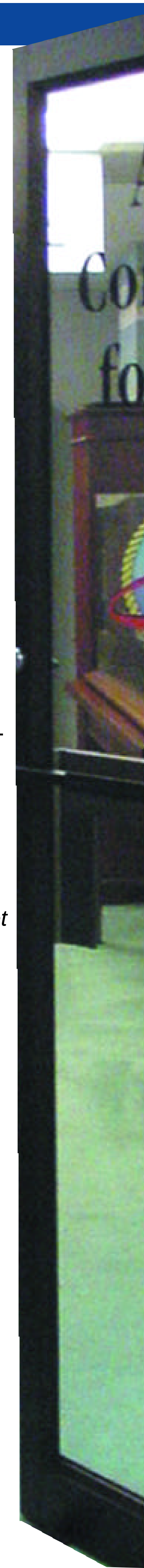
Rear Admiral Bert Kinghorn is a naval engineer and surface operations specialist. He was born in Beaufort, South Carolina and graduated from Beaufort High School in 1966. He graduated from the U.S. Coast Guard Academy in 1971. Rear Admiral Kinghorn served afloat as Student Engineer and deck watch officer on the icebreakers STATEN ISLAND and NORTHWIND. He was Damage Control Assistant on the High Endurance Cutter BOUTWELL and Engineer Officer on the icebreaker POLAR STAR. Junior officer staff assignments included tours as Small Boat Type Desk and Icebreaker Type Desk in the Thirteenth District, and Large Cutter Type Desk in the Fifth District. He served as Chief, Naval Engineering Branch in the Eighth District; Chief of the Support Branch in the Maintenance and Logistics Command Atlantic; and Deputy Commander of the Maintenance & Logistics Command Pacific. As the Project Manager for the Configuration Project, he directed the early development of CMplus, the Coast Guard's keystone logistics management software. RADM Kinghorn led the federal search, rescue and recovery operations for the derailed AMTRAK train *Sunset Limited* while in command of Coast Guard Group Mobile, Alabama. He was a participant in several "watershed" activities including a 1986 study, which reengineered the Coast Guard's logistics systems.

In April 1998, he achieved flag rank and was appointed to the position of Director of the Office of Intelligence and Security in the U.S. Department of Transportation. He assumed command of Maintenance and Logistics Command Atlantic in May 2000.

Rear Admiral Kinghorn assumed his current position as Assistant Commandant for Systems, Coast Guard Headquarters, in June 2002. He is responsible for all Engineering (Civil, Naval, Aeronautical, Electronics), Logistics, and Command, Control, Communications and Computers in the Coast Guard's capital plant, with a replacement value of $27.5 billion. This inventory includes over 200 aircraft, 250 ships, 1,400 boats and 10,000 structures.

RADM Kinghorn graduated from the Massachusetts Institute of Technology in 1977 with the degree of Ocean Engineer, and the U.S. Army War College in 1990. He served as a fellow with the Chief of Naval Operations Strategic Study Group XV, which developed the "network of networks" concept for naval warfare.

His awards include the Legion of Merit, the Meritorious Service Medal and the Coast Guard Commendation Medal. He was the Puget Sound Engineering Council's Engineer of the Year in 1983 and a Coast Guard Foundation Award recipient in 1993. ST



CONTEST

WE ARE!

From left to right standing: Mr. Steve Roush, Mr. Paul Glahe, Mr. Stan Walker

Sitting: LCDR Harry Dudley (now retired CAPT Harry Dudley)

Circa: 1976

Location: 6th floor of the Nassif Building; 400 7th Street, S.W., Washington, DC

Organization: G-EOE-4B - The Buoy and Structures Section (aka Chain Locker), Signal Branch, Ocean Engineering Division, Office of Engineering, USCG HQ.

Where Abouts: CAPT Dudley is retired and lives in Washington State; Stan Walker works in the Office of Civil Engineering (G-SEC); Paul Glahe is Director of Systems Resources (G-SR); and last known Steve Roush was working for the Navy out at the David Taylor Model Basin.

How Many Did You Know: If you have correctly identified 0 you haven't been to Headquarters; 1-2, you are relatively new to Headquarters; 3-4, you have been at Headquarters way too long and should take up residence.

CONTROLLED DATA COLLECTION AND THE VESSEL LOGISTICS SYSTEM

by Shelley Diedrich
Office of Logistics Information
(G-SLI)

Scanning an earlier edition of the *Systems Times* (Summer 2001) I ran across an article written by Dr. Nathaniel Heiner, titled “Knowledge Management.” Dr. Heiner's article addressed several key points, but one in particular caught my attention, he asks “How do we know what we don't know?” How do we know what we don't know? Are there triggers? Where do we begin?

One place to begin is with controlled data collection, a fundamental principle of configuration management. As discussed in the article “Improving Logistics Information Management in Today’s Support World” by CDR Eric Linton (see Summer 2002 *Systems Times*) haphazard or uncontrolled data collection is perilous to our enterprise, at worst it creates a false sense of security, leaving us unprepared and unprotected, and at best, has us chasing ghosts. Simply stated, we must know what we have, what it looks like and how its used. Controlled data collection allows for the rigorous collection of system data and specific element performance. This can include information on people, hardware, software, facilities, policies, procedures and documents -- all things required to produce a capability. As a result of this data collection, system-level qualities, properties, characteristics, functions, behavior and performance can be ascertained. For example, this data can be used for: (l) predicting service life extensions; (2) optimizing resource utilization; and (3) developing impact statements resulting from budget cuts, force reductions or increased mission requirements.

One key characteristic of an enterprise system such as the Vessel Logistics System (VLS) is controlled data collection. VLS merges functionality and data from independently designed applications to provide the end user all relevant data through a single interface. Specifically, VLS integrates the functionality of the Fleet Logistics System (FLS), Configuration Management Plus (CMplus), Supply Center Computer Replacement (SCCR) and the Automated Requisition Management System (ARMS). A natural, if not predicted, effect of this type of system integration is the global view of the organization. The value added to the system as a whole, beyond that contributed independently by the parts, is primarily created by the relationship among the parts; that is, how they are interconnected. This integration allows for the identification and observation of support functions/tasks associated with development, acquisition, test, and sustainment of Coast Guard cutters and standard boats. It captures unit level configuration, maintenance requirements and supply management activities facilitating full vessel logistics support. Unit level data coupled with maintenance and supply data presents an organizational view of vessel support -- operational readiness. VLS provides the ability to capture scheduled maintenance requirements, man-hours, skill level, failure rates and unscheduled maintenance workload requirements for the Coast Guard -- resource utilization. Platform total ownership costs can be generated and monitored to determine supportability and the impact of alternative support concepts on reducing costs. Added bonuses are the ability to: (l) capture "knowledge" data -- referred to by Dr. Heiner, through workflow automation; (2) identify business processes; and (3) preserve those processes.

VLS also provides seamless access to other U.S. Coast Guard (CG) applications such as Large Unit Financial System (LUFS), Contract Information Management System (CIMS) and Naval Engineering Technical Information (NE-TIMS). Specifically, a user can:

- Access financial accounting functionality needed for procurement and other financial transactions at field units, Groups, Districts, Maintenance and Logistics Commands, Headquarters Units and Headquarters.
- Transmit financial data to the CG Finance Center (FINCEN) for update to Departmental Accounting and Financial Information Systems (DAFIS).
- Automate the reconciliation of DAFIS balances with local ledger accounts.
- Generate milestones, create solicitations and contracts, electronically route procurement documents for approval and execution.
- Provide authorized personnel access to engineering technical data such as drawings and technical publications, resident in NE-TIMS, to support local procurements and repair procedures.
- Maintain better financial accountability for an array of maintenance activities and platforms by real time interaction with LUFS and CIMS. Financial accountability shall also be more efficient by eliminating the storage of redundant financial data across multiple applications.

Now that we possess the ability to collect data in a controlled environment, web-enabled reporting tools, such as COGNOS, Impromptu Web Reports (IWR) can be employed. Reports generated provide the greatest organizational benefit -- information. This information might be: number of open Casualty Reports (CASREPs); overdue CASREPs; miscellaneous spending workflow management; maintenance item cost; current ships maintenance projects; availability estimates; percent of time free of C3/C4 CASREPs; percent of required preventative maintenance completed quarterly; allowance list fill rates; and a whole host of other reports. These reports provide a glimpse into the state of the Coast Guard and are available in real time. More importantly, they help answer the need for enterprise-wide information. It is when the data is presented in this fashion, anomalies can be identified -- triggers.

Controlled data collection, coupled with the ability to relate and integrate that data, is essential in providing fact based information. VLS provides this capability. Fact based information supports the Coast Guard's ability to make critical decisions. Reductions in CASREPs; logistics delay time, unscheduled/corrective maintenance actions; and ownership/operational costs are peripheral indicators of VLS effectiveness. ST

Training the Cyber Defenders of Tomorrow

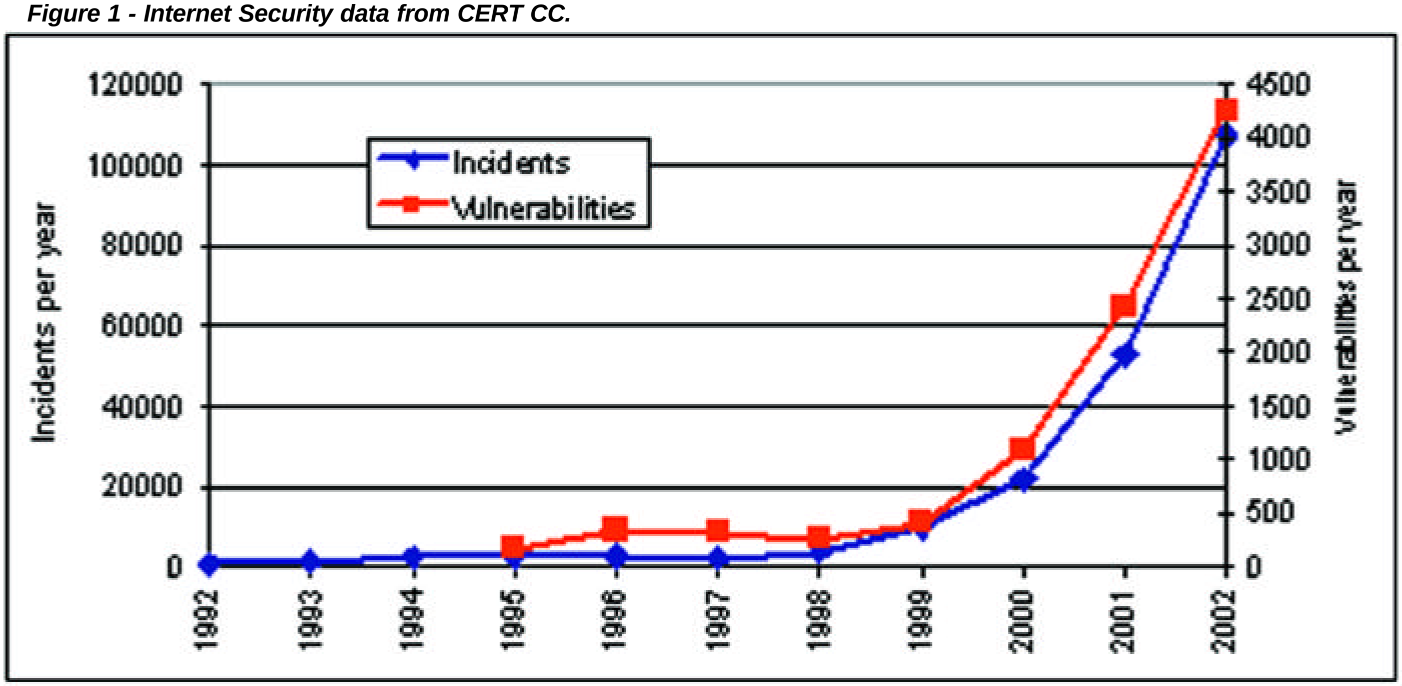
by CDR(sel) Gregory W. Johnson
USCG Academy

Over the last 10 years Internet vulnerabilities and incidents have increased at an alarming rate. Data collected by the Computer Emergency Response Team (CERT) Coordination Center (CERT CC) at Carnegie Mellon University[1] (graphed in Figure 1, with information for 2002 extrapolated from 1st quarter reports) clearly shows that the numbers of both reported vulnerabilities and incidents are rising exponentially. The nature of Internet threats has also changed and become more pervasive. Where it once required extensive knowledge and experience to initiate computer attacks, now new and widely available tools enable almost anyone to launch an attack. In addition, new tools are designed to support large-scale Internet attacks such as the dispersed denial-of-service attacks launched against the White House web site and various commercial sites. Most of these attacks are against known vulnerabilities and greater than 95% (according to CERT CC) could be stopped by applying the appropriate patch or by correct configuration of the service.

What is needed is more education and awareness. In the post-September 11th environment, this is being recognized nationally as can be seen in various news reports: "President Bush's top computer-security adviser, Richard Clarke, speaking at the RSA Conference of computer security experts in San Jose, Calif., said it is just a matter of time before terrorists launch a cyber equivalent of the Sept. 11 attacks on critical infrastructure such as electricity grids."[2] The U.S. Senate is currently working on the Cyber Security Research and Development Act, which would authorize more than $900 million in grants, training and education into computer security. This is just one of several proposed laws that deal with cybersecurity and homeland defense, including: The Federal Information Security Management Act, the Science and Technology Emergency Mobilization, and the National Homeland Security and Combating Terrorism Act.[3] And finally, the Senate Judiciary Committee recently approved legislation authorizing $10 million to help a White House security squad battle Internet terrorism. The bill (S. 1989) authorizes the National Cybersecurity Defense Team headed by White House aide Richard Clarke, the special advisor to the president for cyberspace security.[4]

In order to prepare the Coast Guard's future engineers and leaders for threats such as this, the

Figure 1 - Internet Security data from CERT CC.



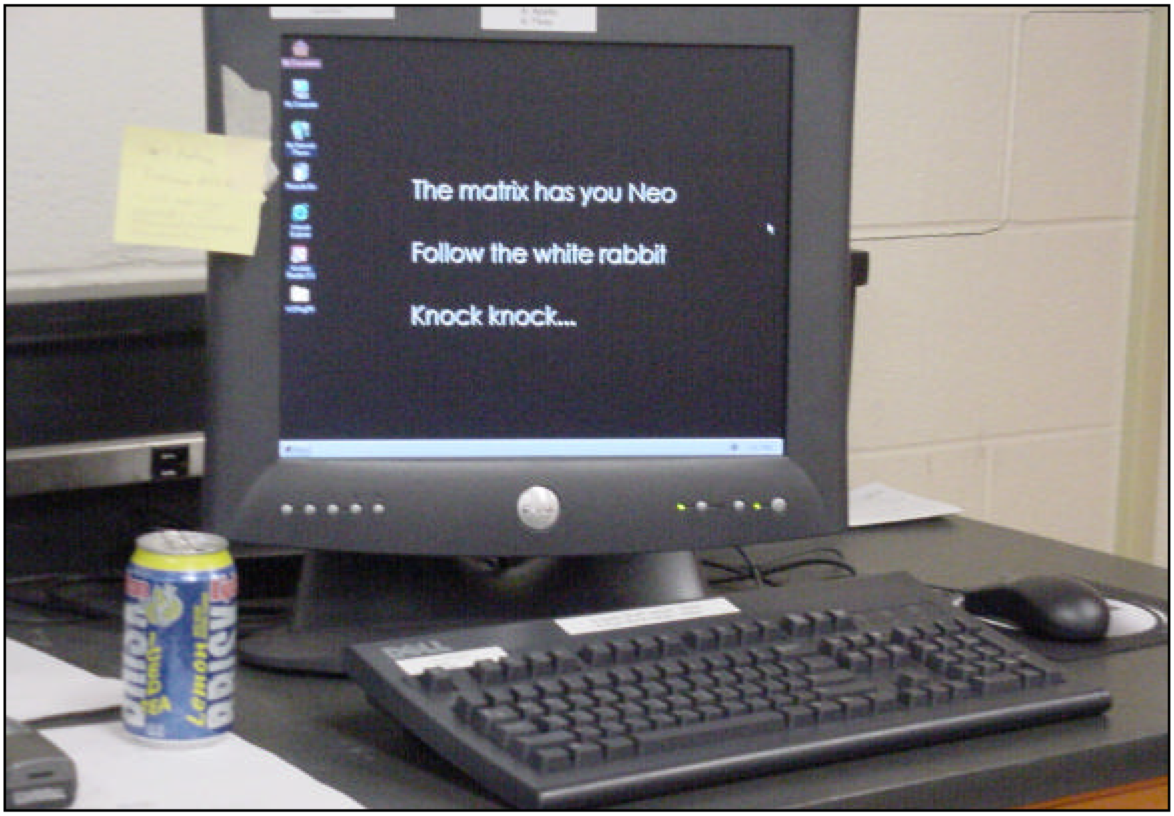


Figure 2. What you don't want to see when you log into your computer!

Coast Guard Academy Electrical and Computer Engineering Section has incorporated the topic of Information Assurance into the Electrical Engineering curriculum. Starting this year, cadets taking the Computer Networks course learned elements of Information Assurance and participated in the inter-Academy Cyber Defense Exercise (CDX).

This was the second year this exercise was conducted, and the first to include cadets at all Academies. The exercise was started last year with the United States Military Academy (USMA), U.S. Air Force Academy (USAFA) and Naval Post-Graduate School (NPS).[5] This year the exercise was extended to include the U.S. Naval Academy (USNA) and the U.S. Coast Guard Academy (USCGA). The U.S. Merchant Marine Academy (USMMA) participated as an observer and will hopefully compete next year. NPS participated, but did not compete for the Director's Cup Trophy (see Figure 3) since they are not an undergraduate institution like the Service Academies. The CDX is sponsored by the National Security Agency (NSA) with funding this year from the Department of Defense (DoD) Public Key Infrastructure (PKI) Program office. A lot of credit for the success of this exercise goes to Mr. Wayne Schepens, the NSA Fellow at West Point who has been the driving force behind its implementation.

The exercise this year was an expansion over last year's, and next year's scope will broaden further still; however, the basis of the exercise remains the same -- defense. Each Academy (Blue Team) started with an identical set of equipment, network architecture and required set of Operating Systems (OSs). Each team was also given a list of services to be installed and configured. It was left to each team to decide how to map services to computers and OSs, to create a security plan and to implement defenses. The opposing force (Red Team), made up of security professionals from the NSA, the Air Force 92nd Information Warfare Aggressor Squadron and the U.S. Army Land Information Warfare Activity (LIWA), attempted to gain access to computers on the network and disable services. The scenario for this year was:

> *Allied (Blue) forces are sending an expeditionary force against the hostile country of Red. The allied combatant force is to be supported by a network architecture known as the Cyber Defense Network (CDN). Threats against the information maintained in this network can be expected from Red cyber-attack forces. It is suspected that the Red forces may have knowledge of the allied CDN architecture, and that they may also have access via external hosts. Red forces can be*

Figure 3. Cyber Defense Exercise Trophy.

> *expected to attempt to access the allied CDN and adversely impact allied operations by obtaining and/or manipulating information deemed critical to the allied mission. The Red forces are not expected to perform network availability attacks, as their operational doctrine favors surreptitious information exploitation over the more overt denial of service attack profile.*[6]

In addition to the Blue and Red Teams, there was also a group of neutral observers, the White Team, comprised of select individuals from Carnegie Mellon University (CMU). The White Team provided an unbiased third party whose evaluation contributed to the CDX scoring; their primary role was to verify service and machine availability. For the exercise, there were White Team observers on-site at each Blue Team location, as well as at CMU in Pittsburgh, Pennsylvania.

The network each Academy team had to secure was a moderately complicated group of three subnets (named Rome, Greece and Olympus) joined together with a router. The networks at each site were also joined together as one large virtual Cyber Defense Network using VPN tunnels. Only one of the three subnets (Olympus) was allowed to be protected by a firewall. Within the subnets were computers running a variety of OSs: Windows NT workstation and server, Windows 2000 workstation and server, Linux workstation and server, and Sun Solaris. The required services included various e-mail and web servers, as well as ftp servers, secure shell, NIS, NFS, samba and a database. The Coast Guard Academy Network is shown in Figure 4.

The cadets at each Academy were given a limited amount of time to set up the network and services, and then implement defenses. The period of 22-25 April was the moment of truth -- the attack by the Red Team. Each day between 0800 and 0900, the services were first verified by the White Team and then from 0900 until 1700 the Red Team could attack. After the attacks each day (until 2400), the cadets could review what had happened, assess compromises, make repairs and stiffen defenses for the next day. Points were earned by having services up, and lost by compromises and breaches in security. Additional points could be earned by successfully identifying the attacks and compromises each day. This information was sent each night to the White Team in the form of a SITREP using secure e-mail.

Have you ever been responsible for a network that has been attacked? If so, were you aware of the attack at the time? These are two excellent questions for network administrators and questions that the participants in the CDX can answer yes to. It is not very often that a network administrator knows when an attack is going to occur, and has the opportunity to use it as a training tool both to test the effectiveness of defenses and to analyze successful attacks. Because of this, the CDX was an outstanding learning tool for the cadets and faculty. The cadets had the hands-on opportunity to install OS patches and secure services and then watch as hackers tried to gain access. Even in cases where a computer was compromised (Figure 2) it was an educational opportunity as the cadets had to determine how the computer was compromised and how to secure it.

For most of the cadets, this was their first exposure to Information Assurance and was a real eye-opener for them about the vulnerability of a network and

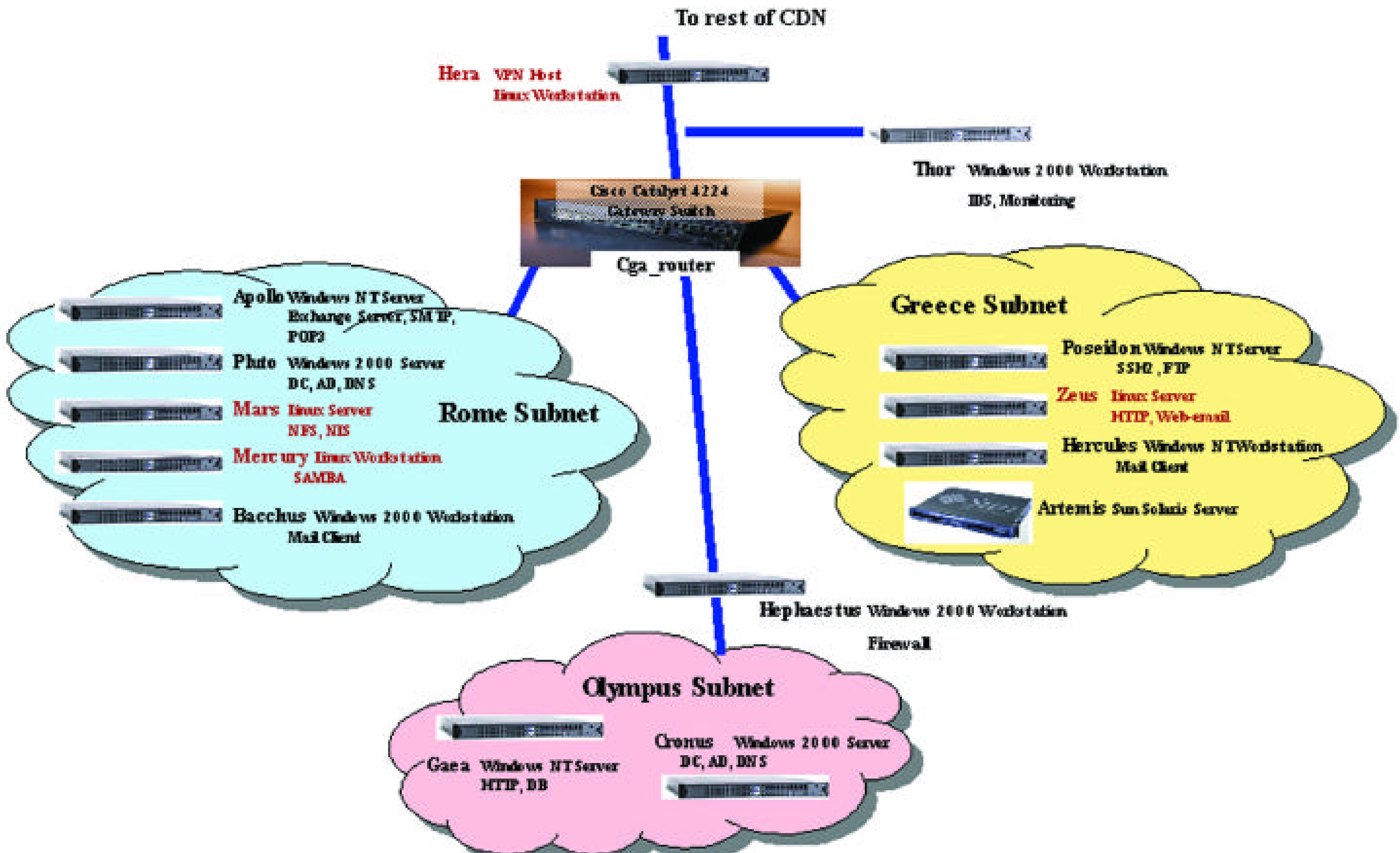


Figure 4. CGA Cyber Defense Network.

the difficulty in securing it. The cadets (and technicians and faculty advisor) put a tremendous amount of time into this effort, both in the set-up and especially in the attack week, but the payoff was great. They learned many lessons:

- How difficult and time-consuming it is to install and maintain services.
- How important it is to keep up with the latest patches to OSs and services.
- The importance of secure passwords and changing passwords whenever a security breach is suspected.
- How easy it is for hackers to breach an unsecured or improperly configured system.

The exercise also allowed the cadets to see and put into use what they had been learning throughout the course about TCP/IP. In addition, it was a great opportunity for them to see and analyze real attacks. And there was certainly plenty of data to analyze -- over **20 million** packets on one day alone. And the result? Despite this being the first ever foray into Information Assurance and the Cyber Defense Exercise by CGA, and despite having the smallest team by far, the cadets came in tied for 2nd place with the USNA! Go Bears!!

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Executive Magazine, May 23, 2002, http://www.govexec.com/

5 "Trial-By-Fire in Information Assurance Education," Donald Welch, Daniel Ragsdale and Wayne Schepens, United States Military Academy, 2000.

6 Blue Forces Oporder, CDX 2002.

Team CGA (left to right) Row 1: ET1 Sam Coker; Row 2: Cadet 1/c Ben Norris, 1/c Darain Kawamoto, 1/c Kevin Shmihluk; Row 3: Cadet 1/c Vince Taylor, 1/c Lee Hartshorn, 1/c Christian Hernaez, 1/c Brendan Evans, 1/c Tom White; Row 4: Cadet 1/c Llars McCarter, 2/c Nate Champlin ,and CDR(sel) Greg Johnson.

The Web Puts Ship Repairs on Target

by LCDR Steven Hendershot and
James Ward
Maintenance and Logistics Command Atlantic MLCA(vs)

In the old days, getting ready for a shipyard repair availability took a great deal of leg work. An Engineer Officer (EO) had access to only one cutter's old specifications. Nearby cutters or Naval Engineering Support Units (NESUs) had additional packages on file, but finding a particular repair was hit-or-miss. Just figuring out what items were due required research and cross-checking numerous plans. Fortunately, the Coast Guard (CG) web has brought vast resources right to the fingertips. Cutters can better define and express their needs; and the logisticians can better meet them. Welcome to the world of e-spec.

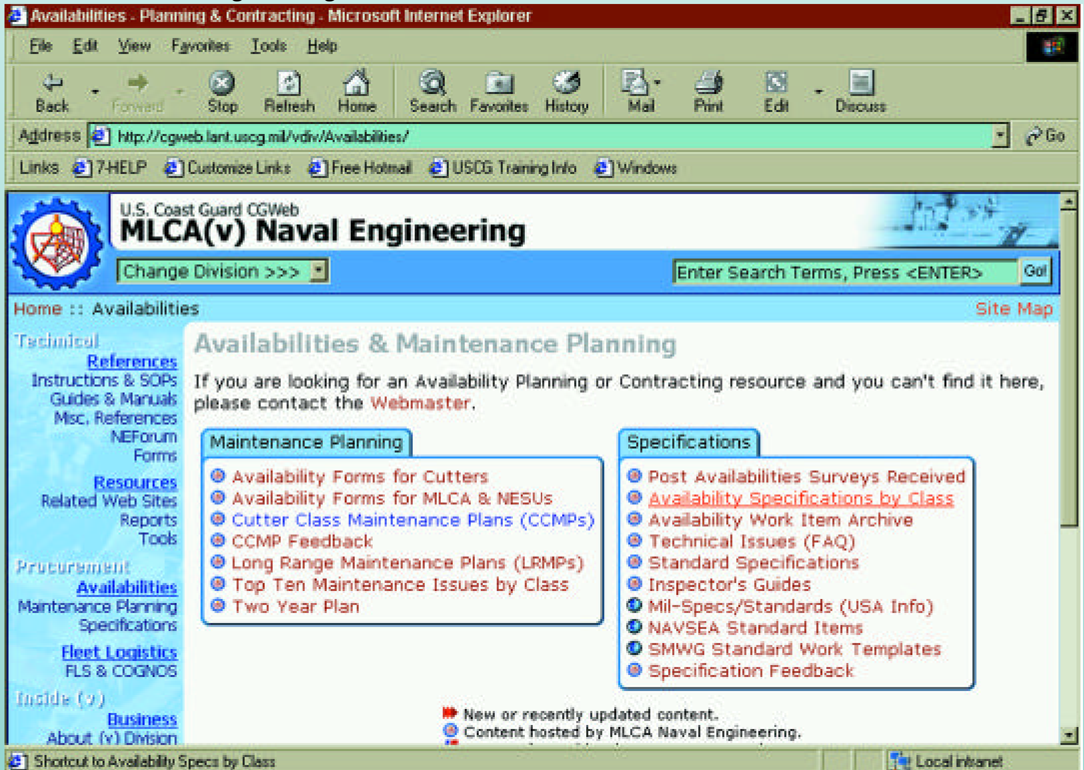
The Need to Push Standards

The Maintenance and Logistics Command Atlantic (MLCA) Naval Engineering Specifications Branch serves to turn customer needs into binding work statements that follow accepted practices. Maintenance needs may be driven by time or condition. In some cases, the Engineering Logistics Center (ELC) or some other external authority establishes maintenance thresholds or intervals. Cutters must be aware of these to properly plan maintenance. Additionally, methods of repair may be established by logistics commands, and these must get out to cutters and port engineers to enable them to oversee and inspect repair work. Maintenance technologies and philosophies continually change, so a means of conveying current policy and practice becomes imperative.

The Need to Pull Assessments

To identify our customers' needs, we must obtain detailed information on existing systems, conditions, action required and interferences. Condition-based maintenance items require a description of their deterioration of function or reliability.

MLCA Naval Engineering is on the web.



How the Web Helps Push Standards

The web allows us to provide to most customers the latest guidance at a low cost. Some of the tools we post include Standard Specifications, Cutter Class Maintenance Plans (CCMP), Long Range Maintenance Plans (LRMP), guides, forms, on-line tutorials and discussions of frequently encountered technical issues. The Current Ship's Maintenance Project (CSMP) Help-line, an e-mail address listed in the MLC on-line Standard Operating Procedure (SOP), allows shipboard personnel to submit inquiries and obtain old work items to help in writing a CSMP.

Web technology is more than a 21st Century version of the "teletype." By effectively implementing currently available web technology, we can deliver guidance in an entirely new way, resulting in an enormous impact on productivity. This guidance can be instantly cross-referenced through an unbounded number of "hyperlinks." Separate "link pages" to this guidance can suit each individual audience, making the guidance much more accessible and palatable for everyone. Furthermore, guidance can be displayed in a format based on the user's real time input where applicable. These revolutionary new methods of manipulating and displaying text and images are being created now. This will improve the way we develop contract specifications.

How the Web Helps Pull Assessments

We pull condition assessment information into the branch on a CSMP form submitted via the Fleet Logistics System (FLS), and we maintain several tools to assist the customer in preparing a CSMP. First, we post current and past specification packages by cutter class on the web. Second, we post an historical work item archive, which lists individual items developed from previous CSMPs. On-line specification feedback allows the branch to incorporate lessons learned from customers into future packages and share them with other customers. Likewise, the on-line CCMP feedback site allows shipboard personnel to suggest changes to the CCMP easily. The availability of drawings through the Naval Engineering Technical-Information System (NE-TIMS), as well as Navy standard items and work templates, leads to better CSMPs by showing system configurations, materials and common repair practices.

As we further implement web technology to retrieve information from the fleet in ways that are carefully designed to meet the specific needs of our easily identifiable groups of users, we will realize the full potential of the web.

Closing the Loop

Combining the dissemination of standards and past practices with the collection of existing conditions and feedback on previous work items results in specification packages that accurately express needed work, minimize contract disputes and satisfy cutter maintenance requirements.

Now picture the web-enabled EOs preparing for drydock. They view the latest CCMP and listing of managed work items for their respective cutter class, search on-line specs by cutter class or key word, cannibalize historical CSMP items, and submit work lists that leave little to the imagination. We've come a long way from the old days of digging through dusty folders, and we will continue to get better.

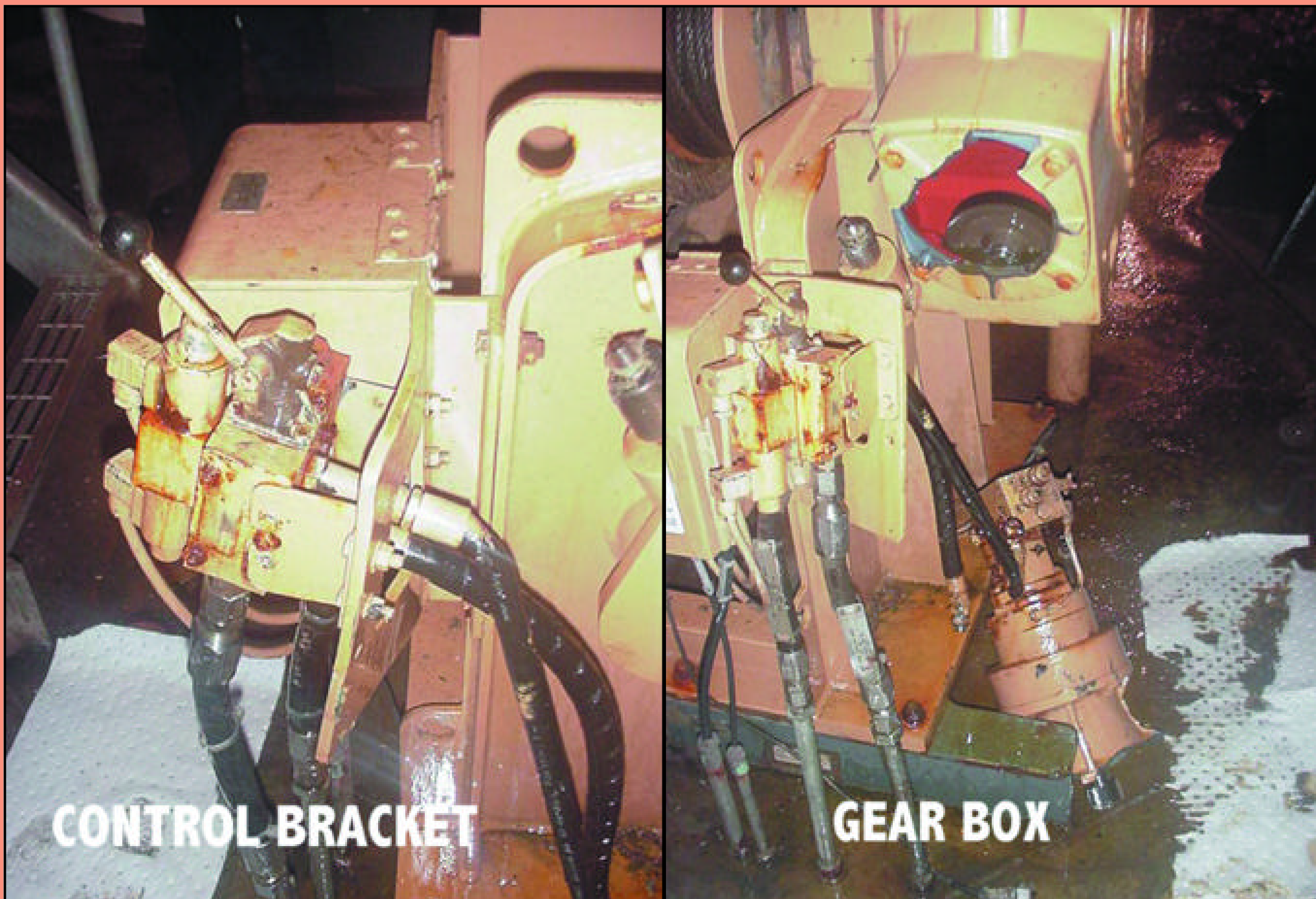
Generation III Load Cells: The 175' WLM Cross Deck Winch Solution

by LT Pat Pippin and
LTJG Sarah Juckett
Naval Engineering Support Unit New Orleans

The 175' Coastal (WLM) Keeper Class Buoy Tenders were outfitted with Generation I and Generation II load cells for measuring cross deck winch loads. Both load cell types were manufactured by ALD. Problems began on Coast Guard Cutter (CGC) HARRY CLAIBORNE in August 2001, when two load cells suffered casualties, and again in October as two more cells failed and were replaced.

In late November, HARRY CLAIBORNE experienced a catastrophic failure of the port forward load cell while working an 8-foot whistle buoy. One crew member was injured as the parted cell allowed the gear box, motor and brake to rotate backwards. The assembly struck the winch control bracket and bent it back 20 degrees, and sheared the motor and brake from the gear box.

Naval Engineering Support Unit (NESU) New Orleans' port engineers met Mr. Mel Cain of Appleton Marine, the cross deck winch manufacturer, at the cutter to further investigate the failure. Upon disassembly, cutter personnel discovered that the parted load cell contained a stress fracture, and that the safety bolt had no attached nut -- rendering the safety feature useless. The stress fracture had separated approximately 70 percent of the thin connection between the two ends of the load cell and with the safety nut gone, the remaining percent -- about 1/2 inch in circumference -- was supporting the entire load and inevitably failed.



Accompanied by LT Pat Pippin of NESU New Orleans, Appleton Marine removed the winch to their facility in Wisconsin for further analysis and overhaul. Working closely with Appleton, a safety notice was issued via Maintenance and Logistics Command Atlantic (MLCLANT) for all WLMs to visually inspect the load cell and safety bolt. Cutters were instructed to inspect the bolt at the bottom of the clevis threads to verify the bolt was 1/2-13NC SAE grade 8 steel, 1-7/8 inches long, and to ensure the bolt had 1/32 to 1/16 inches of end play. If the nut had backed off completely -- or missing -- cutters were instructed not to use the load cell. Further guidance directed that the nut should be snugged-up until tight, then backed-off slightly (just until the fastener rattles inside the load cell), and secured with a loctite product. The cross deck winches affected were winches with the serial numbers 11600-1 through 11600-56. Many cutters reported missing or improper safety bolts, and/or excessive end play from this procedure.

The dubious failure history of this component was reviewed by Appleton Marine, MLCA, Project Resident Office (PRO) Marinette and LT Pippin, and confirmed the field reports suggesting that the Generation I and II load cells have several problems. In service, they regularly experience water intrusion which ruins their electrical integrity and causes associated load metering equipment and alarm sensors to become inaccurate or inoperative. However, water intrusion could not account for all the reported failures, and the team shifted focus to review the cells' mechanical design and testing procedure.

Several tests were conducted in Wisconsin at Appleton's facility, which included Appleton's new Generation III load cell for comparison. Unlike earlier cells, the new Generation III 3PS cell is a solid unit, eliminating the need for the safety bolt altogether. The new load cells are the same as those used on all 225' WLB (Seagoing Buoy Tender) “A” and “B” class buoy tenders.

Destructive tensile tests were conducted on both Generation II and Generation III load cells. The failure load -- as measured at the load cell -- of the Generation II cell was 18,810 lbs, and the Generation III failure was 25,420 lbs. Using the geometry and mechanical advantages from the buoy deck winch system on the cutter, one can calculate the load at the hook by dividing the load at the winch by 0.666. The following results were recorded:

TENSILE TEST	Generation II	Generation III
Failure at Load Cell	18,810	25,420
Failure Load at Hook	28,243	38,168

Not surprisingly, the more robust Generation III load cell supports nearly a third more weight at the hook.

A 12,000 lb static load test was conducted on each cell, which replicates the test conducted during cutter pre-delivery trials. Incorporating that the electrical reliability of the Generation II cell is accurate up to 150 percent of the designed rated load, and the Generation III cell is accurate up to 200 percent, the following results were recorded.

STATIC TEST	Generation II	Generation III
Designed Rated Load (lbs)	5,000	6,200
Electrical Reliability Limit	7,500	12,400
Failure Load at Hook	11,260	18,618

The duration of the static load test was two minutes. During the static load test, the Generation II cells experienced an electrical failure -- as expected. The rated load of this cell is only 5,000 lbs, which sets the maximum tolerable load at the hook at 11,260 lbs (5000lbs x 1.50 x 0.666). This load is greatly exceeded by the standard 12,000 lb static test. Following this discovery, Appleton Marine decided the discrepancy of the Generation II cells was too great and agreed to purchase new Generation III cells to retro-fit the 175' WLM fleet.

Failed Load Cell.

The testing conducted at Appleton uncovered other overlooked problems relating to the 175' WLM load cells. The original MLC specification for testing the cross deck winches varied from the Appleton tech pub and practice for weight testing. The original specification called for a rated load test of 4,000 lbs, short of the actual rated Generation II load of 5,000 lbs. Furthermore, the static brake test was conducted with the same 4,000 lb load, vice the rigorous 12,000 static brake test that Appleton conducted. The MLC specifications for testing the cross deck winches now reflects these load changes.

In mid-January 2002, Appleton Marine published a comprehensive load cell installation and testing procedure in conjunction with MLCLANT, including winch preparation, load cell assembly, overload test, and meter set-up and calibration. These procedures are included at the end of this article.

The total re-examination of the cross deck winch load cells prompted the Generation III replacements, modifications to the testing procedures, and a closer look at the associated components of the load cell and cross deck winch. Thankfully no greater injuries were experienced other than bruising to one crewmember, and the research resulted in a safer, more reliable load cell.

The following supplemental information was provided by Mr. Mel Cain of Appleton Marine and LT Pat Pippin of NESU New Orleans. Other MLCA correspondents include LT Matt Lake, LCDR Douglas Schofield, Mr. Robert Weiske and CWO Louis Willie of PRO Marionette.

Messages Referenced: (Casreps are from the HARRY CLAIBORNE)

121644Z OCT 01	CASUALTY/INITIAL-01019/CROSS DECK WINCH
281700Z NOV 01	CASUALTY/INITIAL-01020/BUOY CROSS DECK WINCH
301941Z NOV 01	175 WLM CROSS DECK WINCH LOAD CELLS
031901Z DEC 01	CASUALTY/UPDATE-01-01020/BUOY CROSS DECK WINCH
281520Z DEC 01	CASUALTY/INITIAL-01-01021/CROSS DECK WINCHES BAD LOAD CELL INDICATING METERS
152037Z JAN 02	175 WLM CROSS DECK WINCH LOAD CELL ADVISORY

The following is the Appleton Marine installation and testing info for the new load cells. ST

memo **APPLETON MARINE INC** **memo**

*3030 E. Pershing St * P.O. Box 6007 * Appleton, WI. 54913-6007*

Date: **WED 12 DEC 01**
Revision: **"1"**
No of pgs: **1 of 5**
Ltr-No: **Gen-3 Load Cell Inst. Proc.**

INSTALLATION PROCEDURE GEN-3 (3PS) LOAD CELLS

Subject: **WLM - KEEPER CLASS - BUOY TENDERS**

Reference: Attached sketches A & B
Gen - 2 Load cell - Photo
Gen - 3 Load Cell - Photo

Prep Cross Deck Winch, Install, O/L test, and Calibrate Gen - 3 (3PS) load cells, (Appleton Marine p/n "YMD-7912*) as follows:

1. **Winch Preparation:**
   Remove Gen - 2 load cell (tension link Item-7).
   Remove upper and lower clevis, pins, and cotter pins. De-burr, clean threads, and clean pins for re-assembly. A hole may need to be drilled in the side fame (see Sketch "B") to facilitate lower clevis pin removal.

2. **Load Cell Assembly:** **Note: Liberally coat all metal interface surfaces with anti-seize.**
   Re-assemble lower clevis, clevis, and cotter pins.
   Assemble the Gen-3 Load Cell to the lower clevis. Be sure threads are coated with anti-seize, and the clevis thread engages the load cell by 3/4" thread engagement (+/- 1/16").
   Assemble the upper clevis to the load cell, making sure of the thread engagement as noted above.
   Install the upper clevis pin through the clevis and reducer torque arm. Be sure all inter-

face parts are coated with anti-seize.
Install the new cotter pins provided with Gen-3 Load Cells.
Remove the old Gen-2 wire with the M/S connector and connect Gen-3 Load cell direct to the meter junction box on the winch utilizing the same color coded identification.

3. **<u>O/L - (Overload) Test:</u>**
   Static test the New Gen-3 / Braking system on each winch after in installing new load cells.
   The test is 200% of rated load or 12,000 lbs.
   See attached Rigging Sketch "A" for details.

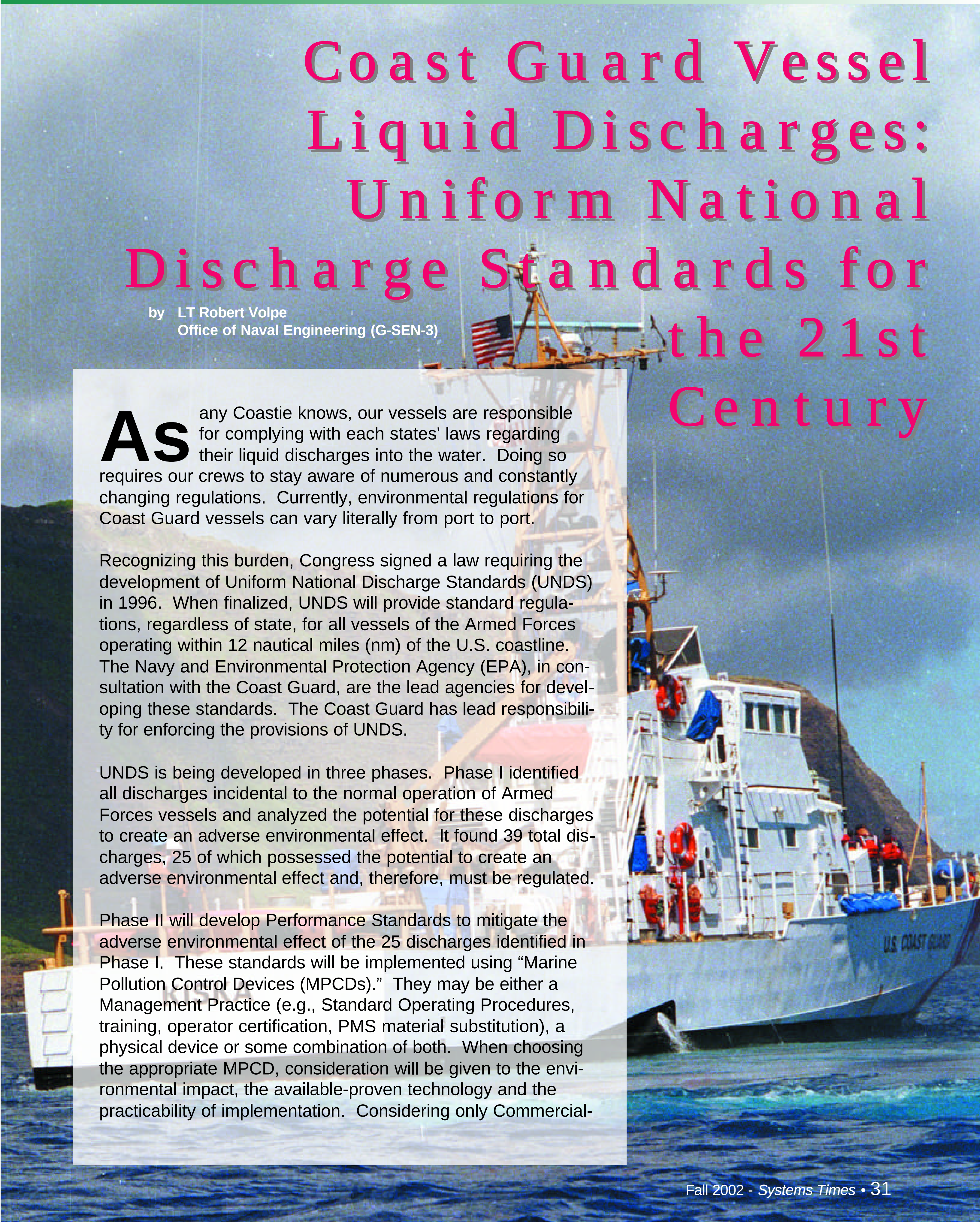
4. **<u>Setup and Calibration:</u>**
   Be sure meters are set-up and calibrate new Gen-3 Load Cells per the attached WLB, 11600 series serial number winches procedure.

5. **<u>The Gen-3 Load Cell Retrofit Kit consists of the following per Ship ser of four:</u>**
   4 ea. Gen-3 Load Cell - YMD-7912 - Rev-4·
   16 ea. Cotter pins - 3/16" dia. X 3.0" long.

6. **<u>Clevis Pin lubrication:</u>**
   Remove and re-coat load cell clevis pins every Six (6) Months with anti seize.

Prepared by: Mel Kane - Appleton Marine - Sen Service Engineer

Coast Guard Cutter HARRY CLAIBORNE.



Coast Guard Vessel Liquid Discharges: Uniform National Discharge Standards for the 21st Century

by LT Robert Volpe
Office of Naval Engineering (G-SEN-3)

As any Coastie knows, our vessels are responsible for complying with each states' laws regarding their liquid discharges into the water. Doing so requires our crews to stay aware of numerous and constantly changing regulations. Currently, environmental regulations for Coast Guard vessels can vary literally from port to port.

Recognizing this burden, Congress signed a law requiring the development of Uniform National Discharge Standards (UNDS) in 1996. When finalized, UNDS will provide standard regulations, regardless of state, for all vessels of the Armed Forces operating within 12 nautical miles (nm) of the U.S. coastline. The Navy and Environmental Protection Agency (EPA), in consultation with the Coast Guard, are the lead agencies for developing these standards. The Coast Guard has lead responsibility for enforcing the provisions of UNDS.

UNDS is being developed in three phases. Phase I identified all discharges incidental to the normal operation of Armed Forces vessels and analyzed the potential for these discharges to create an adverse environmental effect. It found 39 total discharges, 25 of which possessed the potential to create an adverse environmental effect and, therefore, must be regulated.

Phase II will develop Performance Standards to mitigate the adverse environmental effect of the 25 discharges identified in Phase I. These standards will be implemented using “Marine Pollution Control Devices (MPCDs).” They may be either a Management Practice (e.g., Standard Operating Procedures, training, operator certification, PMS material substitution), a physical device or some combination of both. When choosing the appropriate MPCD, consideration will be given to the environmental impact, the available-proven technology and the practicability of implementation. Considering only Commercial-

Off-The-Shelf (COTS) technology may limit available MPCDs, however, the UNDS program is not intended to be a vehicle for testing unproven technology, though it is intended to spur technological innovation for future consideration. It's also worth noting that the MPCDs chosen may be specific to a cutter class i.e., the MPCD chosen to control the discharge of bilgewater from a 47' Motor Lifeboat (MLB) may be different from that of a 378' High Endurance Cutter (WHEC).

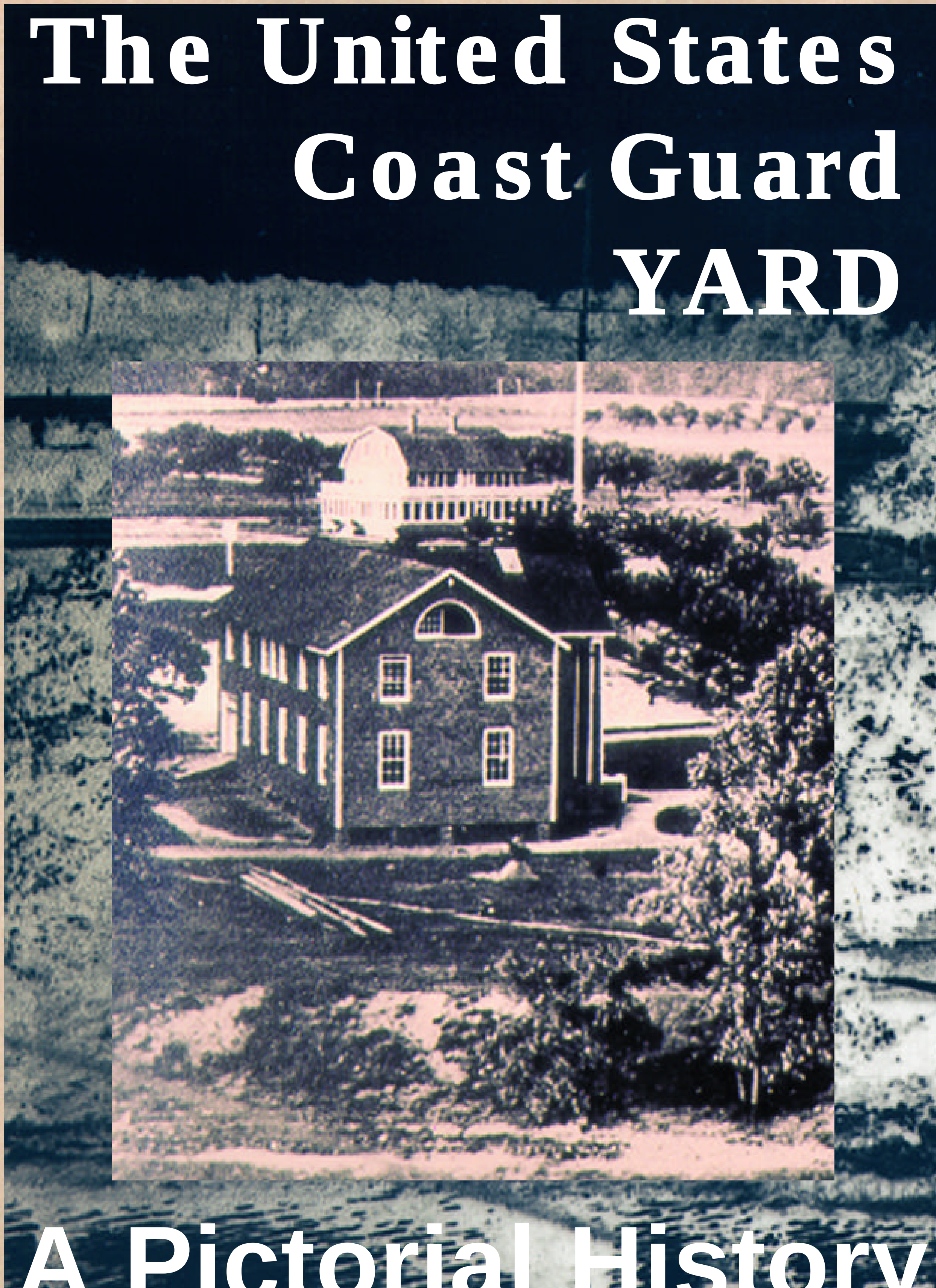
The Phase II schedule has been adjusted significantly. The required MPCD Feasibility and Environmental Impact Analyses are taking longer than anticipated. These analyses are vital to providing Discharge Standards that are both achievable without overburdening our crews and are sufficiently environmentally protective. Originally scheduled for completion in 2001, the new target for completion of Phase II is 2004. We get numerous phone calls from eager sailors looking forward to the clarification that UNDS regulations will bring. However, even when Phase II is completed, Phase III and budgetary considerations will limit the speed at which the regulations can be implemented at the fleet level.

Phase III, which requires developing MPCD Implementation Regulations, is scheduled to begin in 2005. This phase also requires the Coast Guard to develop a mechanism to enforce the provisions of UNDS on all vessels of the Armed Forces. The Coast Guard's Marine Safety and Environmental Protection Directorate (G-M) has lead responsibility for developing this mechanism.

Ultimately, UNDS will be of incredible value to the Coast Guard and its fleet of vessels. By providing one set of standards regardless of location, UNDS protects our state-to-state operational flexibility. Moreover, this single set of standards provides a consistent set of training standards for our sailors. Just as UNDS benefits the Coast Guard, it's good for the environment. Because its standards must be reconsidered every five years, UNDS is sure to create environmental technological innovation. It is without question a win-win endeavor.

For more information on UNDS, visit the UNDS web site at http://unds.bah.com or the Coast Guard Office of Naval Engineering web site at http://cgweb.comdt.uscg.mil/g-sen/gsen.htm (Click on Environmental Issues) or contact the Coast Guard's representative to the UNDS effort, LT Bob Volpe at (202) 267-1998, rvople@comdt.uscg.mil.

The United States Coast Guard YARD



A Pictorial History

The United States Coast Guard YARD: 103 Years of "Service To The Fleet"

For over a century, the United States Coast Guard YARD has built, repaired and renovated ships in Baltimore, Maryland, for the U.S. Coast Guard. The YARD is the Service's sole shipbuilding and major repair facility and an essential part of the Coast Guard's core industrial base and fleet support operation.

The history of the Coast Guard YARD heralds scores of success stories and recognizes the shipyard's vital contributions to the United States Coast Guard during the past 103 years.

The Foundation for Coast Guard History recently selected the YARD for the 2002 Coast Guard Unit History Award (large unit). The honor is the Foundation's annual recognition of a Coast Guard organization that is engaged in specific undertakings which promote the rich heritage of the United States Coast Guard.

The Coast Guard YARD relates its story below with enthusiasm and pride and the hopes for continued "Service To The Coast Guard Fleet" into the 22nd century!

The Revenue Cutter Service founded the Coast Guard YARD in 1899 to repair and construct small life-saving boats.

1899-1909

1899-1909

In April 1899, the Revenue Cutter Service (RCS) signed a lease with a prominent Baltimore physician and attorney for 36 acres of farmland surrounding Arundel Cove. Two months later, LT John C. Moore, USRCS, arrived aboard the side-wheeler COLFAX to begin establishment of his experimental shipyard. LT Moore's original plant set-up of four small buildings included a mill for sawing and shaping lumber. The following year saw the arrival of the CHASE, a training ship for the RCS. The crew set up permanent quarters at the Arundel Cove "Depot," marking the beginning of the Coast Guard Academy. In 1905, Congress authorized the purchase of the Depot's land, added additional acreage, and the "Revenue Cutter Station At Curtis Bay" was permanently established. Throughout its first decade, the "Depot" repaired many life-saving boats, constructed a variety of small boats, conducted overhauls and painted RCS cutters.

In 1900, the crew of the CHASE, a training ship for the Revenue Cutter Service, set up permanent quarters at the Arundel Cove "Depot" and marked the beginning of the Coast Guard Academy. Among other activities, the Academy formed its first baseball team.

The Revenue Cutter CHASE.

1909-1919

The Depot's facilities were consistently improved upon during the decade of the teens. New construction included a boiler and pump house, a foundry, boat, sheet metal, electrical, paint, upholstery, blacksmith shops, new mess halls, barracks, garages, recreation building and storage structures. In 1915 when the Revenue Cutter Service and Lifesaving Service combined to form the U.S. Coast Guard, the Depot was selected as the site to train surf men in the care and operation of new gasoline engines destined to replace the traditional oars and sails of the Lifesaving Service. The engine school was housed in a shed along the west Depot boundary. When World War I broke out in 1917, the Coast Guard became part of the U.S. Navy and several Navy units were sent to the Depot for repairs and conversion. Work on these Navy vessels was expedited to the fullest extent.

The Corps of Cadets participated in training exercises at the YARD in 1909. Until 1910, the YARD was the first permanent home of the Coast Guard Academy, now located in New London, Connecticut.

1919-1929

During the 1920's, production of boats, canvas work and numerous other articles for the needs of the Service were stepped up. Extensive overhauls and repairs were performed on the then-modern vessels YAMACRAW, SENECA, SEMINOLE, and many 100', 125' patrol boats and tugs. The 500 personnel of the Depot included civilian employees along with enlisted men. In 1928, there were 245 wage board and two classified employees on the civilian payrolls. The military complement was 250. The workload was flexible, increasing considerably in the summer months and decreasing in the winter months. The Depot had gained a nationwide reputation for the fine quality of its work. Its small boats were famed throughout the world, wherever life-saving stations were located or cutters patrolled the seas. The Depot's production was excellent.

In the 1930’s, modernization of the Depot’s facilities took place as well as constructing and equipping several new shops. As production increased, so did the comradery of the work force. Destined to become an annual event, the Depot's employee picnic started as a tradition during this decade and has continued throughout the years.

1929-1939

1929-1939

By the 1930's, many of the original buildings and equipment at the Depot had become outdated. Funds were obtained through Congressional appropriations to modernize the plant. A new boat, gas engine and machine shops were constructed and equipped; a 40 ton marine engine railway was installed. With the transfer of the Lighthouse Service of the Department of Commerce to the Coast Guard in 1939, buoy construction became another major Depot function.

The YARD in 1914. Photo taken from an aerial ballon.

1939-1949

1939-1949

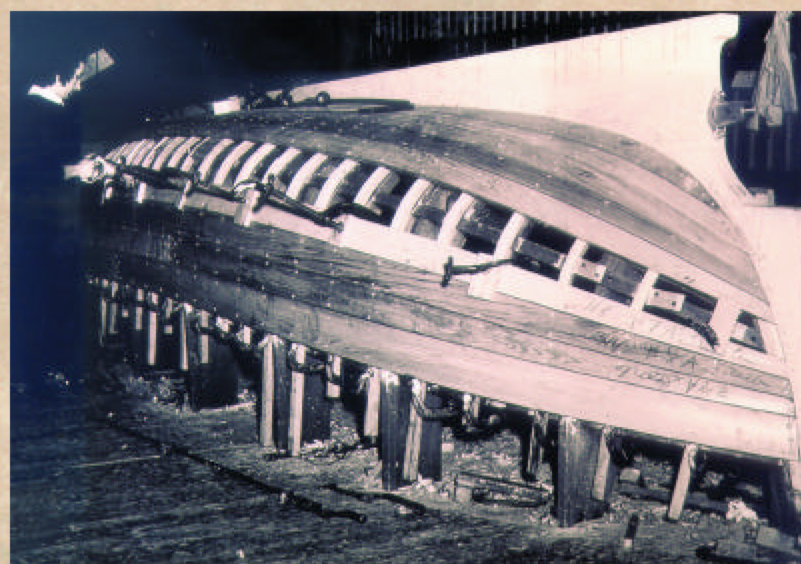
With the advent of World War II, the Depot underwent extensive expansion to meet war demands. Improvements included a 3,000 ton floating dry dock, two shipways and a 320' by 60' concrete pier with tower crane. The Depot, now comparable in size and functions to a medium-size Navy shipyard, was officially designated the U.S. Coast Guard YARD. The shipyard's work involved repair of scores of surface vessels including submarines; buoy manufacturing; production of canvas work for the Coast Guard, and building over 300 small wooden boats annually. The new work era included the construction of the largest cutters ever built at the Yard -- the 225' Cutters MENDOTA and PONTCHARTRAIN. The YARD employed 3,100 civilian workers during World War II. Beside the assigned military complement, the Coast Guard's wartime Training Station or Boot Camp added to the number of personnel at the YARD. Public attention was afforded the YARD not only for the production and repair of Coast Guard craft, but also for its nationally renowned athletic teams. The name of the game was ice hockey. The Coast Guard “Cutters” emerged as champions of the Eastern Amateur Hockey League in 1943 and captured the U.S. Amateur Title in 1944.

During the war years, the United States Coast Guard “Cutters,” the YARD's ice hockey team, captured many titles. In the 1943-'44 season, the “Cutters” won the U.S. Amateur Title.

On April 29, 1944, the YARD launched the 255 foot PONTCHARTRAIN. It was one of the largest class of cutters to be built at Curtis Bay.

The YARD in 1942.

The YARD in 1944.

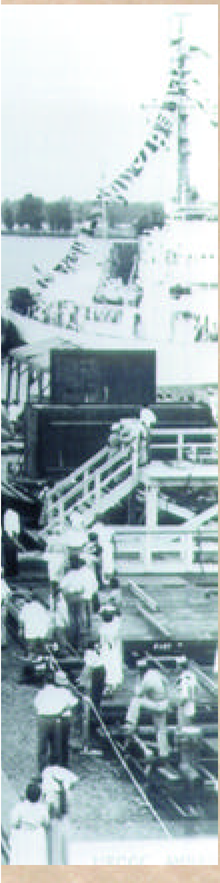


The shipyard's version of "Rosie the Riveter" worked on the 26 foot monomoy, one of the many small, wooden hull boats constructed at the YARD during WWII.

Hundreds of Coast Guard recruits attended "Boot Camp" at the YARD's training station during the Second World War.

The era of the 1950's saw the construction of the Coast Guard Lightships SAN FRANCISCO and AMBROSE. The YARD launched the AMBROSE on August 4, 1952. The following year, the Lightship AMBROSE returned to the YARD for the installation of a new mast and beacon light. The tripod mast was the first to be installed on a lightship in the Coast Guard fleet.

In the later 1950's and throughout the 1960's, the YARD excelled in boat construction. The Coast Guard credits the YARD with the construction of virtually all the Service's small craft, including the 31 foot boat pictured above.



1949-1959

1949-1959

As the YARD reduced its work force to fit the Service's post-war needs, vessel overhaul, gun repair work, buoy construction and miscellaneous manufacturing made up much of the YARD's workload. The era of the 1950's saw the construction of three hundred 40' steel life saving patrol boats, the Coast Guard Lightships SAN FRANCISCO and AMBROSE, and small craft like the 36'8" motor lifeboats. In February 1953, the first of the 95' steel patrol boats was launched at the YARD. In total, fifty-eight 95 footers were built for the Coast Guard and the U.S. Navy throughout the decade of the 1950's into the early 1960's. The YARD continued to perfect its reputation for the overhaul of aging Coast Guard and Navy ships. Such cutters were the CHILULA, AVOYEL, DEXTER and COMMANCHE. In March 1959, the Coast Guard Cutter AZALEA, a 100' buoy tender, was launched at the YARD.

Throughout the 1950's, the YARD constructed over sixty 95 foot patrol boats for the Coast Guard and U.S. Navy. In the late 1970's, sixteen YARD constructed patrol boats of the 95' fleet were repaired and modernized at the shipyard.

1959-1969

1959-1969

The YARD continued to prosper during the decade of the 1960's. The first of fifty-three cutters built at the YARD under the 82' patrol boat program was launched in February 1960. During the Vietnam conflict, twenty-six of the YARD built 82 footers served with distinction as "Coast Guard Squadron One." In April 1962, the prototype of the 44' steel self-righting motor lifeboats (MLB) was launched. During the next 10 years, the YARD built one hundred and ten 44' MLBs. In May 1965, the YARD sent its first 210' medium endurance cutter down the shipways, the Coast Guard Cutter (CGC) CONFIDENCE. The skilled hands of the YARD constructed the 210' Cutters CONFIDENCE, RESOLUTE, DURABLE, DECISIVE and ALERT. During the 1960's decade and into the early 1970's, the YARD constructed five 157' buoy tenders -- the RED WOOD, RED BEECH, RED BIRCH, RED CEDAR and RED OAK. On the small boat construction side of production during the 1960's, the YARD built two hundred and six 25'8" fiberglass motor surfboats.

During the decades of the 1960's and early 1970's, the YARD constructed five 157 foot buoy tenders -- RED WOOD, RED BEECH, RED BIRCH, RED CEDAR and RED OAK. The YARD launched the RED BEECH on June 6, 1964.

The YARD in 1967.

The YARD built seventeen 82 foot patrol boats in the 1960's. The 82' fleet served with distinction during the Vietnam War.

From 1965 to 1968, the Coast Guard YARD built five 210 foot medium endurance cutters-- the CONFIDENCE, RESOLUTE, DURABLE, DECISIVE and ALERT. On a rainy April 30th in 1966, the Coast Guard Cutter RESOLUTE, constructed by the skilled hands of the YARD, slipped down the shipways.

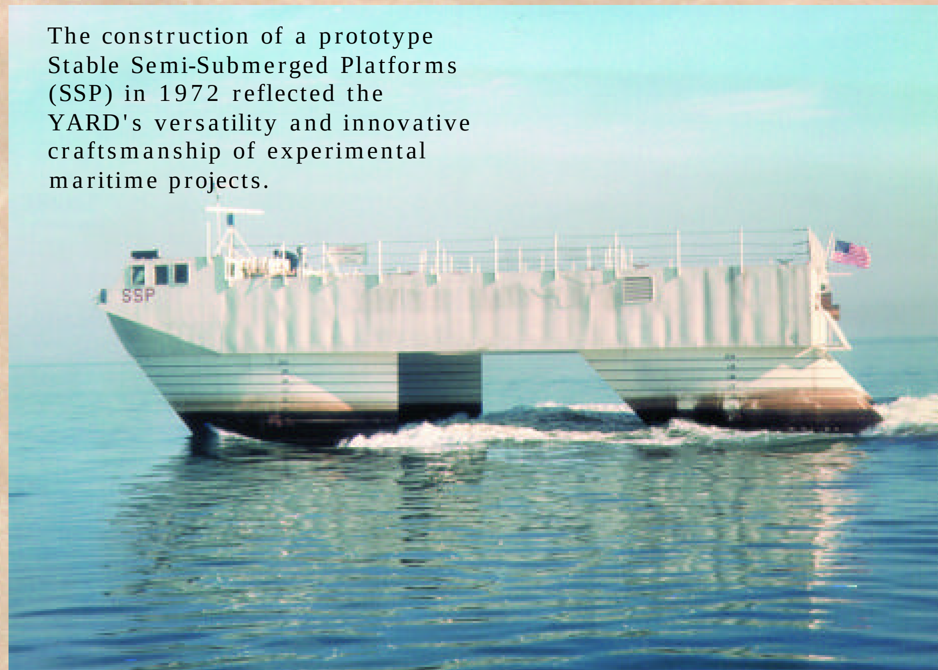
On April 14, 1962, the YARD completed construction of the prototype 44 foot steel motor lifeboat. During the next 10 years, the YARD built 110 of these self-righting boats for the Coast Guard fleet. The 44 footers replaced the old wooden 36 foot motor lifeboats built by the YARD in the early 1940's.

1969-1979

1969-1979

The 1970's engaged the YARD in a flurry of activity. The trades continued the manufacturing of the Coast Guard's lighted buoys, a program which begun at the YARD during the Second World War. Constructed in an assembly line mode, lighted reflector buoys -- large, steel buoys used for round-the clock aids-to-navigation -- and lighted ice buoys used for heavy ice conditions were manufactured at the YARD. Begun in 1975, the YARD became the sole source for overhaul of the Coast Guard 5” 30 caliber gun mount. The 5” gun mounts were used on the Service's 378' cutters. In 1971, the YARD completed construction of a prototype 41' Utility Boat (UTB). It sported an aluminum hull and fiberglass superstructure. The YARD built boat was adopted, and from 1973 through the early 1980's, the YARD constructed two hundred and seven 41' UTBs. The craft is well known to recreational and commercial boaters throughout the United States and is used primarily for search and rescue. The YARD had proven record for the design of experimental maritime projects. The construction of the prototype Stable Semi-Submerged Platform, or SSP, was the highlight of the 1970's. The SSP KAIMALINO used the SWATH concept -- small waterplane area twin hull. The craft operated successfully for many years in the Hawaiian islands. In 1974, the YARD laid the keel for a 160' single unit construction tender, the Coast Guard Cutter (CGC) PAMLICO. Throughout the remaining decade, three more 160' construction tenders were built at the YARD: CGC HUDSON, CGC KENNEBEC and CGC SAGINAW. From the late 1970's into the early 1980's, the YARD renovated sixteen 95' patrol boats. Built at the YARD in the 1950's, the cutters were in need of modernization or repair.

From 1948 to 1988, the YARD manufactured the Coast Guard's lighted buoys. Constructed in an assembly line mode, lighted reflector buoys -- large, steel buoys used for round-the-clock aids-to-navigation -- and lighted ice buoys used for heavy ice conditions were manufactured at the YARD at a rate of 130 buoys each year.



The construction of a prototype Stable Semi-Submerged Platforms (SSP) in 1972 reflected the YARD's versatility and innovative craftsmanship of experimental maritime projects.

Ordnance Shop Technicians overhaul a five inch gun from a 378 foot high endurance cutter. From 1975 to 1990, YARD technicians refurbished twenty-eight 5" gun mounts for use in the Coast Guard fleet.

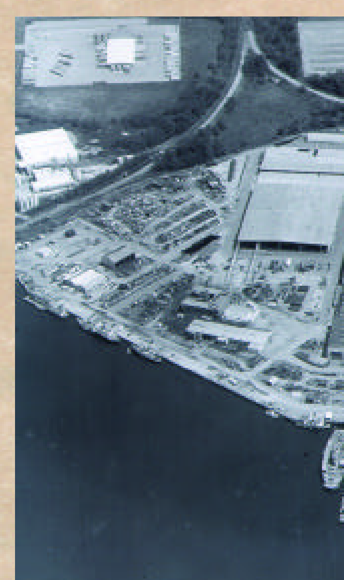
The YARD in the 1970's.

The YARD began construction on the first aluminum hull 41 foot patrol boat in 1973. By 1982 when the program ended, YARD tradesmen had constructed 207 boats. Today, they are used primarily for search and rescue around the world.

In the early l980's, the YARD began a retrofit program for all of the newly constructed 270' medium endurance cutters. The project eventually upgraded the l3 cutters in the class, including the CGC TAMPA pictured in the accompanying photo. Work included rebuilding the magazine decks, additional modifications to the flight decks, upgrades of electronics packages and installations of chemical-biological-radiological warfare washdown counter measure systems. The 270' Retrofit program concluded in l991.

In 1985, the YARD completed a major renovation of a ferryboat for Coast Guard use at Governor's Island, New York. The KULSHAN, a 30 year old vessel bought by the Coast Guard from the State of Washington's ferry system, was renamed the GOVERNOR following renovation at the Coast Guard YARD.

As the decade of the 1980's came to a close, the Coast Guard tasked the YARD with the construction of six river barges for Coast Guard use on the Mississippi and Missouri Rivers. The YARD received the project when the awarded private contractor filed for bankruptcy prior to contract completion.



After completing an extensive, four year overhaul project on the Coast Guard Barque EAGLE in the 1980's, the YARD again welcomed the majestic cutter in 1995, 1998 and 2001 for scheduled repair availabilities.

The YARD in the 1980's.

1979-1989

1979-1989

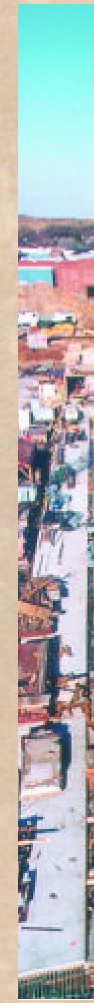
Entering the 1980's, the YARD constructed a prototype oil skimmer used to clean up oil spills. The Zero Relative Velocity Skimmer, ZRV, represented the best available technology in the Coast Guard's field of fast current pollution control research. The first of the new 270' medium endurance cutters, the Coast Guard Cutter (CGC) BEAR, arrived at the YARD in 1983 to being post construction and electronics work, under the program title, 270' Retrofit. The YARD accomplished a retrofit on 12 additional 270' cutters throughout the 1980's. Beginning in 1984, the YARD began the Service Life Extension Program (SLEP) for nine 180' buoy tenders in the Coast Guard fleet. From the mid 1980's through the early 1990's, the Cutters SORREL, GENTIAN, COWSLIP, CONIFER, MADRONA, LAUREL, PAPAW, SWEETGUM and BUTTONWOOD received a mid-life overhaul and were given an anticipated 20 additional years of service life as a result of the YARD's renovation. In 1984, the YARD recommissioned the first 210' medium endurance cutter under the Coast Guard's Major Maintenance Availability Program (MMA). The Cutters ACTIVE, CONFIDENCE and RELIANCE received their upgrades during the 1980's decade. Eleven more vessels underwent renovation throughout the 1990's before the program came to a close. The YARD's overhaul gave each MMA cutter an anticipated additional 15 years of service life. In 1985, the YARD completed a major renovation of a ferryboat for Coast Guard use at Governor's Island, New York. The KULSHAN, a 30 year old vessel bought by the Coast Guard from the State of Washington's ferry system, was renamed the GOVERNOR following renovation at the YARD. As the decade of the 1980's came to a close, the Coast Guard tasked the YARD with construction of six river barges for Coast Guard use on the Mississippi and Missouri Rivers. The project was transferred to the YARD when the awarded private contractor filed for bankruptcy prior to contract completion.

1979-1989

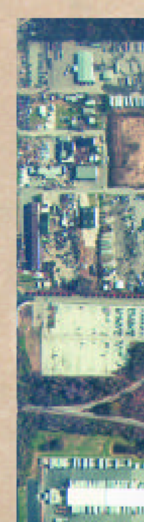
1979-1989

From 1987 through 1998, the Coast Guard YARD recommissioned fourteen 210 foot medium endurance cutters under the Coast Guard's Major Maintenance Availability Program (MMA).

The Cutters ACTIVE, CONFIDENCE, RELIANCE, VIGILANT, DILIGENCE, VIGOROUS, VALIANT, STEADFAST, ALERT, DAUNTLESS, VENTUROUS, RESOLUTE, DEPENDABLE (pictured to the left in 1997) and DECISIVE received an upgrade that gave each MMA cutter an anticipated 15 years of service life.



In 1984, the YARD began the Service Life Extension Program (SLEP) for nine 180 foot buoy tenders in the Coast Guard fleet. From the mid 1980's through the early 1990's, the Cutters SORREL, GENTIAN, COWSLIP, CONIFER, MADRONA, LAUREL, PAPAW, SWEETGUM and BUTTONWOOD received a mid-life overhaul, giving them an anticipated 20 additional years of service life.



1989-1999

1989-1999

After completing an extensive, four year repair project on the Coast Guard EAGLE in the 1980's, the majestic cutter returned to the YARD in 1995 and 1998 for repair availabilities. The YARD built 26 small aids-to-navigation workboats, the 49' BUSLs, from l997 through the year 2000. The first BUSL was launched in August, 1997. The YARD completed the 210' Major Maintenance Availability Program in October 1998, with the recommissioning of the Cutter DECISIVE. Fourteen of the Coast Guard's 210' cutters underwent, respectively, an 18 month, $21 million renovation at the YARD since the program began in 1984. With the dedication of the new $18 million shiplift in November 1997, the YARD increased its capability to accommodate repairs of Coast Guard vessels. The land based ship handling facility replaced the YARD's nearly 60 year old dry docks. The shiplift is environmentally friendly and offers lower maintenance costs. The YARD is the sole source for major repair of naval weapons systems used by the Coast Guard fleet. Topping the list is the repair of the MK 75 76mm guns and includes a current contract with the Naval Sea Systems command for the overhaul of the Saudi Arabian MK 75 weapons systems. The YARD expanded its market base in the mid 1990's to include the overhaul of the Paxman engine, the main propulsion engine of the 110' patrol boat fleet. The work is considered a primary example of core work for the shipyard. The YARD has excelled in its capability to bring its expertise to the customer rather than the customer coming into the YARD for service. The YARD has built a celebrated reputation for taking its skills “on-the-road” to the Coast Guard fleet worldwide, averaging l00 road trips annually. In the area of quality management, the YARD excelled in the decade of the 1990's. Quality achievements include winning the Commandant's Quality Award in l993 and l996; the DOT Quality Award in l993; the U.S. Senate Productivity Award in l996 and the Vice President's Hammer Award in l997. The YARD was designed a National Performance Review Reinvention Lab in l996 and became the first organization in the United States Government to achieve ISO 9001 certification in 1995. ISO 9001 is a set of internationally recognized standards for quality management systems.

In the winter of l997, progress continued on the Yard's shiplift, pictured halfway thru construction in the photo above. The view is from the outboard portion looking inland. Two-thirds of the left finger pier and nearly one third of the right finger pier are visible in the foreground. Some of the piling to complete the right finger pier is pictured at right. The cleared dirt area in the background is most of the upland “parking lot” onto which vessels will be towed for repair work. The marginal wharf, complete in center, extends the upland portion of its full 440' x l50'.


The YARD in the 1990’s.

1989-1999

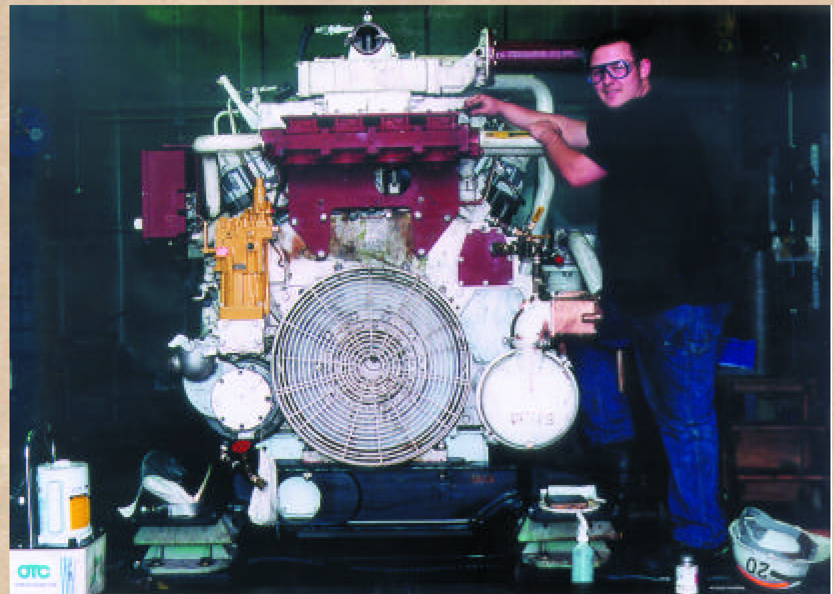
1989-1999

With the dedication of the new $18 million shiplift in November 1997, the YARD increased its capability to accommodate vessel repairs. The largest land-based ship handling facility in the continental United States, the shiplift offers lower maintenance costs and is environmentally friendly.

Marketing its expertise to "Other Government Agencies" such as the U.S. Army, the YARD has repaired and overhauled numerous floating causeway units and manufactured miscellaneous components for the causeway systems. The "floating roadways" permit transportation of goods and personnel over water to land during deployment.

The YARD completed the conversion of the Coast Guard Cutter ALEX HALEY in July, 1999. A former Navy rescue and salvage ship, the 282', 27 year old cutter received habitability, mechanical and environmental upgrades as well as a flight deck. The Cutter is homeported in Alaska and serves the Coast Guard missions of search and rescue and law enforcement.

Coast Guard YARD Centennial-1999:
"The United States Coast Guard salutes the men and women of the Coast Guard YARD whose skillful hands have created, renovated and repaired the ships, systems and equipment that have allowed the Coast Guard to do its job throughout the past century. Happy Centennial, Coast Guard YARD, and best wishes for success in your next 100 years of 'Service To The Coast Guard Fleet'!"
Admiral James M. Loy
Former Coast Guard Commandant



In the fall of 1999, the YARD opened a newly constructed Engine Dynamometer Testing Facility. The building accommodates in-house performance testing by measuring the mechanical power of Paxman and Caterpillar engines, the main propulsion machinery of 110' patrol boats.

The YARD's quality journey began in the early 1980's with the creation of the quality circles program. The quest for quality has continued over the past twenty years. In 1995, the YARD was the first organization in the U.S. Government to attain ISO 9001 certification. In 2000, the Yard was the first shipyard in the United States to receive ISO 14001 Certification. Other YARD achievements in quality include two Vice Presidential Hammer Awards, the Maryland Senate Productivity Award, the DOT Quality Award and two Coast Guard Commandant Quality Awards. The YARD is also a designated National Performance Review Laboratory For Reinventing Government.

The accompanying photo captures the presentation of the 2000 Hammer Award to the Coast Guard YARD. U.S. Senators Paul Sarbanes (center) and Barbara Mikulski (right) are pictured in the photo center presenting the Hammer Award plaque to the 49' BUSL Production and Gainsharing Team.

1999-present

1999-present

In l999, the YARD celebrated its Centennial. The year-long celebration focused customer attention on the shipyard's commitment to maritime excellence; honored the YARD's past and present work force, and sought public recognition of the accomplishments and goals of the U.S. Coast Guard's century old shipyard.

The dawn of the new millennium continued the YARD's quality service to the Coast Guard fleet. YARD tradesmen completed the last 49' BUSL workboat in 2000 and turned its operation over to Coast Guard Station Curtis Bay, a tenant command of the YARD. The YARD-built BUSLs today successfully operate in l3 states in the United States servicing the aids-to-navigation needs of the American public. During the winter of 2001, the YARD completed the “Over-the-Horizon Boat” prototype project for the Coast Guard. In an effort to boost the Coast Guard's war on drugs, the YARD has accommodated the Coast Guard Cutters MOHAWK and BEAR with a new and faster boat launching system designed to catch and stop smugglers' drug laden craft. Annually averaging 23 scheduled/emergency repair availabilities for the Coast Guard fleet, the YARD's industrial work schedule has been filled with such core work over the past few years. Recent VIP customers have included the Coast Guard Barque EAGLE and the 378' High Endurance Cutter DALLAS, both gracing the YARD's shiplift for the first time during the winter and summer of 2002. The beginning of the 2lst century also saw the YARD expand its market base to service the shipyard needs of Other Government Agencies (OGA) such as the U.S. Army, U.S. Navy and the State of Maryland. Today, nearly 18% of the YARD's industrial work includes OGA customers. The YARD continues to excel in the quality arena with recent attainment of the ISO l400l certification. This world-class pollution prevention standard pledges the YARD to good stewardship of its surroundings and continuous improvement of environmental management practices. And to round out the list of accomplishments, the YARD received its second Hammer Award for expert management of the 49' BUSL construction program and gainsharing initiative.

Prior to the 2001 holiday season, the Coast Guard Barque EAGLE returned to the YARD for an anticipated six month repair availability. This visit, however, celebrated EAGLE's inaugural lift on the YARD's land-based ship handling facility.

Spring, 2002, marked an historic milestone for the YARD as the land based ship handling facility cradled five Coast Guard vessels for the first time. Positioned on the shiplift's elevator platform and concrete working pad, the Cutters FINBACK, BARBARA MABRITY, KATHERINE WALKER, MADRONA and FARALLON are “readied” for Coast Guard work by the skilled hands of the Coast Guard YARD.

1999-present

1999-present

The YARD began the Coast Guard's ll0' Hull Sustainment Project in the spring of 2002. Playing a critical role in the Coast Guard missions of homeland security and search and rescue, the Island Class patrol boats have clocked in many services hours and are nearing the end of their anticipated service life. The goal of the Hull Sustainment Project is to eliminate hull corrosion and add another ten years of service life to each craft. The YARD anticipates working on five island class boats through the end of 2002. Due to full capacity of the YARD's shiplift in the summer of 2002, the shipyard used a single point lift and deployable ll0' cradle to lift the Coast Guard Cutter CHINCOTEAGUE onto pier side space to begin hull sustainment work.

After nearly two decades, the YARD welcomed back the Coast Guard High Endurance Cutter DALLAS in the winter of 2002. The occasion commemorated a “moment in YARD history” for DALLAS became the first 378' cutter to be cradled on the shiplift for needed repairs. Exceeding previous dry-dockings by more than l,000 tons, the YARD executed DALLAS' complex docking plan with precision and accounted for stern overhang and propeller blades that extended five feet below the keel.

During the winter of 2001, the YARD completed the "Over-the-Horizon Boat Prototype" project for the United States Coast Guard. In an effort to boost the Service's war on drugs, the YARD accommodated the 270' Cutter MOHAWK with a new and faster boat launching system designed to catch and stop smugglers' drug laden craft.

In conclusion,

In conclusion,

the Coast Guard YARD is proud to have maintained a tradition of maritime excellence that has spanned over a century. With a conscientious goal to satisfy its customers and a commitment to produce a competitive product, the Coast Guard YARD will continue to prosper and further build on its renowned reputation of quality "Service To The Coast Guard Fleet!"

Coast Guard YARD

"In the wake of the September llth, 200l attack on America and the intensity of the Coast Guard response role in the homeland security realm, the value of the Coast Guard YARD to provide the necessary agility to sustain critical fleet readiness is ever more crucial to our Coast Guard and our nation."

Policy Statement - 2002

BEST-VALUE COMMERCIAL SOLICITATIONS AND PERFORMANCE-BASED SPECIFICATIONS

by LT Edwin Velazquez
Naval Engineering
Maintenance and Logistics Command Atlantic MLCA(vs)

In order for the Coast Guard to reduce procurement cost and facilitate greater use of industry and commercial standards, Maintenance and Logistics Command Atlantic (MLCLANT) will be increasing the use of performance-based specifications vice prior reliance on detailed, how-to specifications.

Detailed specifications, to a large degree, require a contractor to follow the Government's way of performing a task. They include precise measurements, tolerances, materials, quality control requirements and other Government requirements that control the processes of contractors and restrict their ingenuity.

Performance-based specifications are structured around the purpose of the work. They do not dictate how the work is to be accomplished. They allow a contractor to deliver the required services by following their own best practices. Since the prime focus is on the end result, contractors can adjust their processes, as appropriate, without the burden of contract modifications, provided that the delivered service (outcome) remains in accordance with the specification.

Performance-based specifications are, to the maximum extent practicable, stand-alone documents, with minimal references to detailed drawings, other specifications or standards. Only mandatory requirements should be referenced in the performance-based specifications.

Accordingly, much of the risk is shifted from the Government to industry, since contractors become responsible for achieving the objective in the work statement through the use of their own best practices and processes. For instance, if a contractor performs a task, following the Government's detailed specifications exactly, and the end product or service is faulty, who's to blame? Not the contractor, since the task was performed in accordance with the Government's dictated process.

Using performance-based specifications requires some degree of operational risk management, in which, the probability and severity of hazards are identified and assessed. However, high-risk work items, such as routine drydocking and welding, because of their inherent risk, require a great deal of scrutiny. This is where the Proposal

Evaluation Team (PET) comes into play.

The PET usually consists of the Naval Engineering Support Unit (NESU) Port Engineer, MLC Type Desk (vr), MLC Specification Writer (vs), and on occasion, a Contract Specialist (vpl). *Note*: the Contract Specialist on the PET cannot be the Contract Specialist responsible for the procurement. The PET will evaluate and rank potential contractors as “Exceptional,” “Very Good,” “Satisfactory,” “Marginal” or “Unsatisfactory,” based on some or all of the following criteria:

Technical information and documentation.

Equipment. Drydock capabilities, production capabilities, plant facilities and equipment available to perform the work.

Procedures. Welding and brazing procedure, documentation of performance plans, quality assurance and control plans, management plan for handling peak workloads, purchasing and subcontracting procedures.

Personnel. Welder's professional qualifications (training and experience), documentation of recruitment and training plans, workload factors for manpower utilization and labor resources.

Past performance. The contractor's performance in prior related contracts during the last three years are evaluated according to:

Quality of service. Did the customer get what was specified? Did the customer consider the final product high in quality?

Cost control. Were costs controlled by the contractor?

Timeliness of performance. Was the contract completed in time? If not, why?

Business relation. How was the customer service? Was the contractor committed to customer satisfaction?

Subcontracts. Were subcontractors involved? How were they managed?

Price proposal. The Contracting Specialist (responsible for procurement) along with the Contracting Officer evaluate the price proposal. The PET does not see the Contractors' price proposal until after their evaluation is complete. The PET bases their evaluation solely on technical information and past performance history.

The Contracting Officer reviews the PET evaluation and price evaluation for the purpose of determining if a price/performance trade-off analysis is needed. If requested by the Contracting Officer, the PET will perform the price/performance trade-off analysis. The Contracting Officer having reviewed the technical evaluation report, price evaluation and trade-off analysis, makes a source selection decision and documents the file.

We believe that a contractor's past performance is a key indicator of future performance and can affect decisions to exercise options or make future contract awards. Past performance assessments are a quick way to generate improved performance and reward exceptional performance. Consequently, we are now placing an increased emphasis on contractors past performance.

Currently, MLC(vs) is in the process of reviewing and gradually eliminating detailed requirements in our specifications. Our use of references will describe only the performance needed in those references, and if practicable, extract only the actual requirements necessary. The extracted requirements are then placed in the specification versus an open-ended reference. We are also researching industry and commercial practices and converting federal and military standards to industry and commercial standards, where the risk to accept those practices is negligible.

It is a fact that commercial market areas and their practices are continually evolving, being reshaped and responding to various trends in the market place. Using sound business practices based on our education, training, experience and lessons learned, we can ensure that contractors have the freedom to determine how to meet the Government's performance objective effectively. ST

CO-LOCATING DGPS AND LORAN TRANSMITTERS

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INTRODUCTION

The United States Department of Transportation (DOT) is coordinating the implementation of a network of Differential Global Positioning System (DGPS) broadcast sites across the continental United States, Alaska, Hawaii and Puerto Rico. Several Federal and state agencies, including the Federal Railroad Administration (FRA), Federal Highway Administration (FHWA) and the United States Coast Guard (USCG) are involved in the effort to install the NDGPS Broadcast Network. When completed, this nationwide system will consist of over 126 sites and provide a standardized signal for DGPS service throughout the United States. Planned uses of the Nationwide Differential Global Positioning System (NDGPS) network include positive train control, precision farming, smart vehicles, snow plow management, accurate waterway dredging and improved emergency response -- an expansion of traditional uses which include harbor/harbor approach navigation, vessel tracking and buoy positioning.[1]

The implementation of NDGPS is based on the existing network of USCG maintained maritime broadcast sites. The USCG's role in the project is to implement the expansion of new sites and provide maintenance and support for each transmitting facility. Although the NDGPS system uses identical reference station and integrity monitoring equipment as the maritime DGPS sites, the NDGPS sites have several differences. These include an alternate transmitter option, larger, more efficient broadcast towers, and a robust, highly reliable back-up power system. Most differences are the result of an agreement that transferred property from the U.S. Air Force (USAF) to the USCG.

At the same time the NDGPS project was gearing up, the USAF was in the process of decommissioning its system of Ground Wave Emergency Network (GWEN) sites. Although the GWEN sites were designed for a different purpose, the layout of each site and transmit antenna was well suited for DGPS broadcasts. The USAF transferred ownership of many of the GWEN sites as well as the assets that were staged to build additional GWEN sites to the USCG.

Although many of the existing GWEN sites were built in locations that provide much of the necessary coverage area for the NDGPS project, many holes exist that require construction of new towers. Locating property that meets the requirements for these sites has been challenging. Additionally, acquiring leases, the public notification process and obtaining environmental clearances creates a large resource drain on the project. The entire process can stretch out to three years for some sites. The costs associated with building a new site are also about three times that of converting an existing facility. During a meeting of the USCG's DGPS RF NWG (Natural Working Group), an idea was suggested to combine the signals of a DGPS broadcast, and a LORAN-C (Long Range Aids to Navigation-C) broadcast onto a LORAN tower. This idea showed merit, especially after the previous successful diplexing effort of a DGPS and NAVTEX signal at the NDGPS site in Savannah, Georgia.

Diplexing DGPS with LORAN turned out to be much more challenging than diplexing with NAVTEX. The output power of a LORAN transmitter dwarfs the output of a DGPS transmitter. After looking at ways to minimize the destructive interference, the DGPS RF NWG decided to try a different approach. One idea was to feed the antenna from a different point than where the LORAN transmitter was connected. If a cable was connected to the end of a Top Loading Element (TLE) and dropped straight down to connect to a DGPS transmitter, the resultant DGPS interference on the LORAN transmitter would be minimal and a filter would not be required on the output of the LORAN transmitter. Unfortunately, this approach was rejected by the USCG's tower community as unsound due to the downward force on the TLE. Another option would be to extend the length of the TLE down closer to the ground level. This method would alleviate any civil engineering concerns but would alter the LORAN tower and still present the problem of dealing with the large amount of LORAN RF at the DGPS transmitter. A third and best option is using a portion of the LORAN tower structure not used as a LORAN antenna. This concept eliminates almost all the destructive interference of the two systems while providing the benefit of sharing the tower structure. The concept was renamed from DGPS/LORAN diplexing to DGPS/LORAN co-location.

NAVTEX/DGPS AT SAVANNAH

In 1999, the USCG NDGPS Oversight Group was approached with the request to use the facilities at the proposed Savannah (Pembroke), Georgia, NDGPS broadcast site for the purpose of also broadcasting a NAVTEX signal. This site was slated for conversion from a decommissioned USAF GWEN Repeater site to a state-of-the-art NDGPS site using the existing 290-foot antenna.

The standard GWEN style NDGPS broadcast tower is 299 feet with 12 TLEs and 100 ground radials extending at a radius of 300 feet. Figure 1 shows the layout of a typical site. Operating at 285-325 kHz, with a bandwidth of 30 to 80 kHz and a rate of 100-200 Bits Per Second (BPS), these antennas can radiate the DGPS MSK modulated signal at 55% efficiency. The Savannah NDGPS site operates at 319 kHz using a Southern Avionics SC-1000 Transmitter at a radiated output power of 60-1000 Watts (W). Traditionally, this transmitter would use a Southern Avionics PC1KILO Antenna Tuning unit to match the antenna to the transmitter. NAVTEX is an international automated Medium Frequency (MF) direct-printing service for delivery of navigational and meteorological warnings and forecasts, as well as urgent marine safety information to ships within

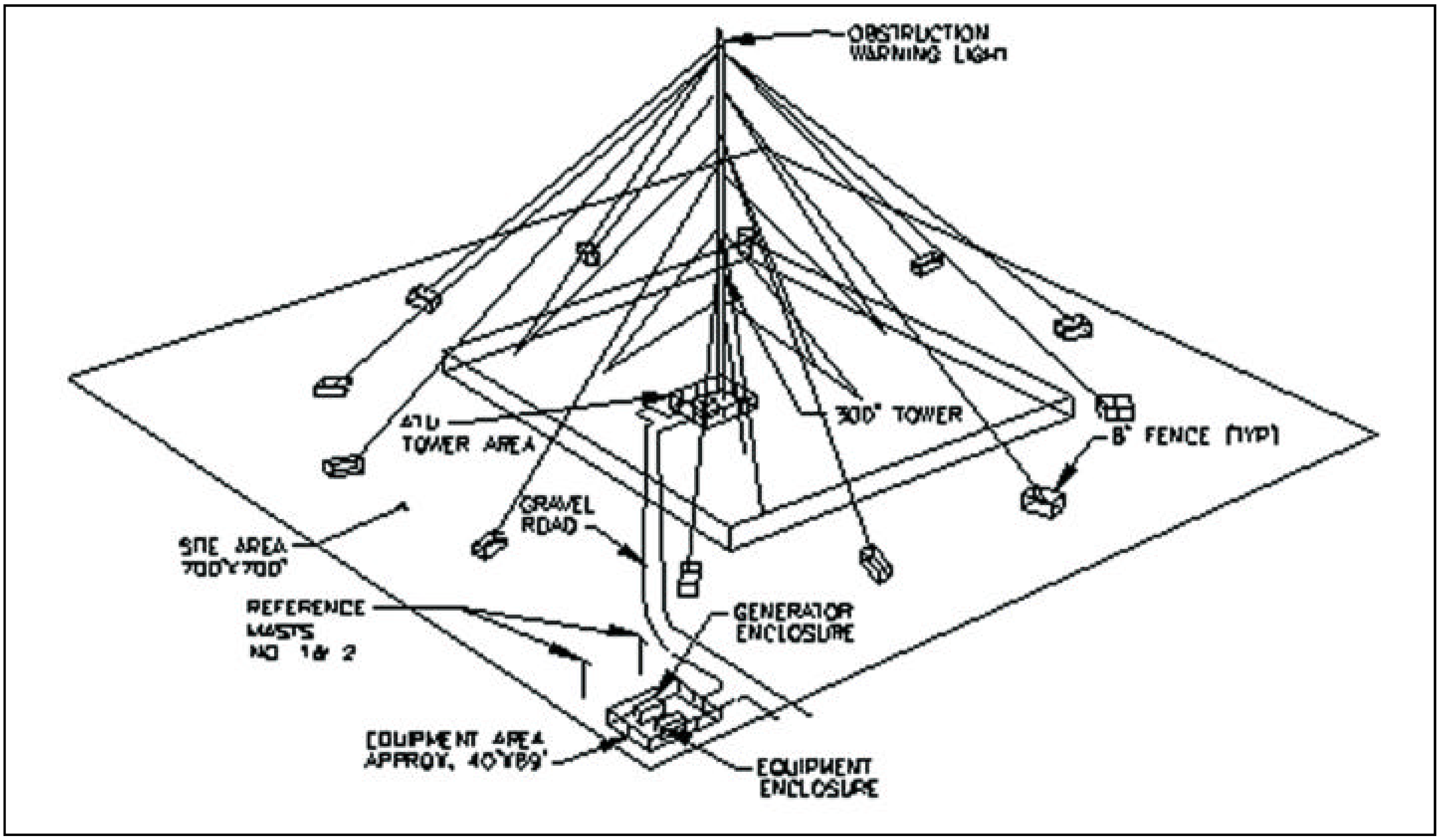


Figure 1. Typical NDGPS Broadcast Site Layout.

approximately 200 nautical miles of shore. The USCG operates NAVTEX stations in the U.S.[2]

The International Maritime Organization (IMO) has designated NAVTEX as the primary means for transmitting coastal urgent marine safety information to ships worldwide. NAVTEX broadcasts are made on 518 kHz using narrow-band, direct-printing, 7-unit forward error correcting transmission. The Amateur Radio community also uses the NAVTEX messages, most often in the Amateur Teleprinting Over Radio (AMTOR) or Packet Teleprinting Over Radio (PACTOR) modes. These broadcasts use 100-baud Frequency Shift Keying (FSK) modulation with a frequency shift of 170 Hz. The center frequency of the audio spectrum applied to a single side band transmitter is 1700 Hz. USCG NAVTEX transmissions are typically broadcast using a Nautel ND2500TT transmitter with a power at 2500 W through a Nautel NX4000TUB Antenna Tuning Unit (ATU).

The USCG contracted Allied Technology Group and R. Morgan Burrow and Associates in 1999 to design and implement a Pass Reject Diplexer Filter Network that would allow the DGPS and NAVTEX signal to be transmitted simultaneously through the same 299 foot tower at the Savannah site without either signal interfering with the other.

The antenna diplexer contains components that allow the two transmitters operating at these different frequencies to couple power to the same radiator but not to each other. Antenna diplexing at MF was accomplished using low-loss pass reject filters built with discrete reactive components. These filters are comprised of a pole-zero, series-pass, parallel-reject network, where the zero represents a low-impedance path through the series-resonant branch of the circuit tuned to the desired pass frequency. The pole represents high impedance at the undesired frequency presented by the parallel resonant combination of a variable reactance connected across the tuned series resonant circuit. A high reject ratio is desirable to block the higher frequency from entering the low frequency transmitter and vice versa.[4]

The final diplexer implemented at the Savannah NDGPS site consists of straightforward pole-zero network elements. The DGPS portion, looking from the transmitter to the tower, needed the SAC coupler/diplexer network to match to a final impedance of:

Z = 8.0 ohms - j 17.7 ohms at 900 W (319 kHz).

The NAVTEX portion as seen from the transmitter to the tower needed the NAUTEL coupler/diplexer network to match to:

Z = 38.5 ohms + 237.9 ohms at 2500 W (518 kHz).

The site has operated steadily since 1999 with a DGPS effective radiated power of nearly 400 W and NAVTEX effective radiated power at about 1200 W.

LORAN

LORAN-C is a Low Frequency (LF) radio navigation aid operating in the 90-110 kHz radio spectrum, centered on 100 kHz. Although primarily employed for maritime and aviation navigation, LORAN-C transmissions are increasingly used for frequency reference, precision timing and communications. LORAN-C had its beginnings in 1952, having evolved from the LORAN-A system originally developed for military use in the early 1940's and the NAVAGLOBE LF system developed in 1945. In 1974, it was selected as the federal radio navigation system for the Coastal Confluence Zone. Subsequently, the Federal Aviation Administration (FAA) has designated LORAN-C as a supplementary system in the National Airspace System (NAS). The North American LORAN-C system, a joint operation between the USCG and the Canadian Coast Guard, consists of 29 transmitting stations, 29 monitor stations and three control stations. Although not included as part of the NAS, an international agreement also links a portion of the United States LORAN-C and Russian Chayka (LORAN) systems.

Three types of transmitting antennas, or towers, are currently in use in the North American LORAN-C system: Top-Loaded Monopole (TLM), Sectionalized LORAN Tower (SLT) and the Top Inverted Pyramid (TIP). Figure 2 shows a TLM antenna. The TLM is composed of three major parts: the antenna, the Top-Loading Elements (TLEs) and the counterpoise. The upper half of a TLM is one half of a center fed dipole antenna. There are between six and 24 TLEs attached at the top of the TLM. The ends of the TLE are insulated with fiberglass strain insulators and are supported by the TLE support guys. Top loading increases the capacitance of the antenna to ground thereby increasing the bandwidth. Top loading also increases the effective height of the antenna resulting in greater efficiency. TLMs are "hot," i.e., the structure itself is the antenna. Therefore a base insulator insulates the monopole from the ground. Because antennas are seldom placed over a perfect ground, the imperfect conductivity of the earth brings about changes in both input impedance of the antenna and the radiation pattern.

A counterpoise, or ground screen, is typically a series of wires placed at specific intervals that radiate outward symmetrically from the base of the antenna. The counterpoise provides a more homogonous ground for the antenna. Presently, the TLM configuration was chosen for co-location proof of concept testing.

Figure 2. Top-Loaded Monopole (TLM) Antenna.

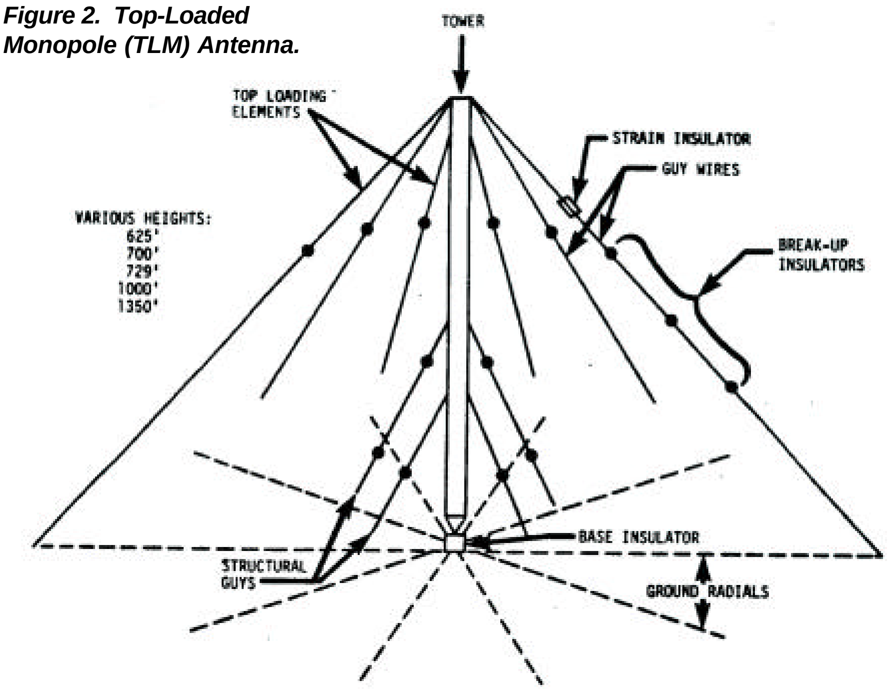


Figure 3 shows the SLT antenna, one of two Multi-Tower Arrays (MTAs) used to transmit LORAN-C signals.

Figure 4 shows the TIP antenna, the second type of MTA used to transmit LORAN-C signals. The differences between these antennas include: tower height, spacing between towers and the design of the top hat. Note that the effect of these differences in mechanical design results in considerable differences in electrical characteristics.

Table 1 depicts some of the electrical characteristics among the various tower types in the U.S. and Canadian LORAN-C antenna inventories.

Co-located LORAN-C and DGPS transmitters could potentially share transmit antennas. One method is to simply share sections of the tower structure, thereby configuring a dual-purpose antenna. Another method is to share use of the active elements of the antenna tower itself through diplexing. We will not provide an extensive discussion of the impact of diplexing on the characteristics of the LORAN-C signal because the current research effort is focused on co-location. We will instead address some areas requiring analysis during any co-location effort.

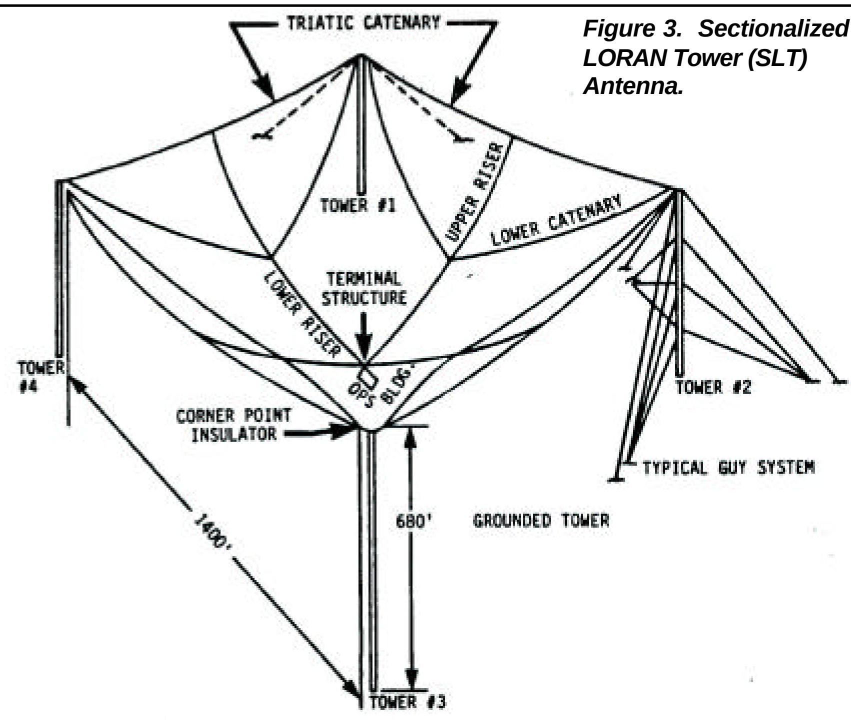


Figure 3. Sectionalized LORAN Tower (SLT) Antenna.

LORAN-C signals are precisely defined in the USCG Commandant Instruction COMDTINST M16562.4A, *Specification of the Transmitted LORAN-C Signal*. Additional clarifying information is also available in Wild Goose Association Publication No. 1/1976, *LORAN-C System Characterization*. Because LORAN-C transmissions are used for multi-modal purposes (navigation, timing, communications), the impact of co-location on each mode should be carefully analyzed.

Navigation. The power that a LORAN-C station radiates directly determines the cover-

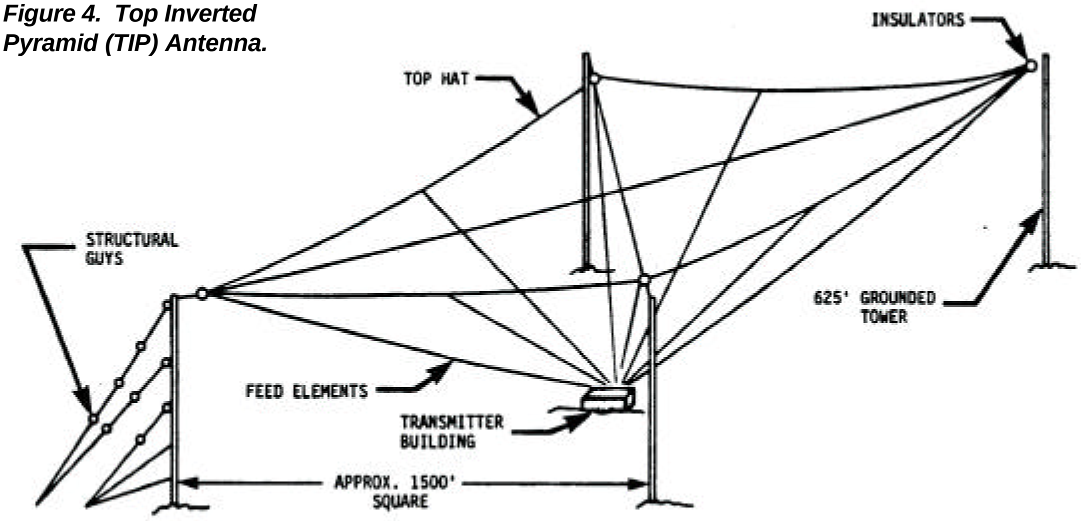
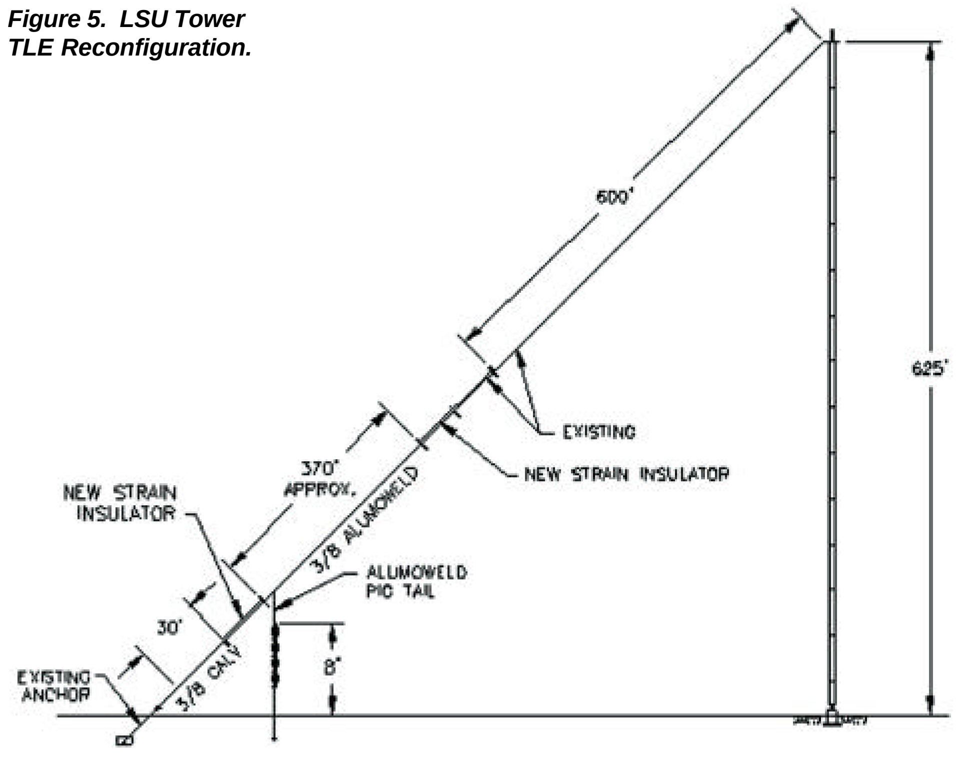


Figure 4. Top Inverted Pyramid (TIP) Antenna.

Tower Type	Number in USA	Number in Canada	Characteristic Impedance (ohms)	dX/dF Slope (ohms/kHz)	Number of Top Loading Elements
500-FT TLM	0	1			
625-FT TLM	8	2	2.5 - j25	2.7	24 EA, 600'
700-FT TLM	8	0	4.0 - j23	3.0	12 EA, 740'
720-FT TLM	1	0			
721-FT TLM	0	1			
850-FT TLM	0	1			
1350-FT TLM	1	0	16.8 - j37	4.4	6 EA, 550'
SLT	5	0	3.3 - j15	1.2	None
TIP	1	0	4.6 - j13		None

Table 1. LORAN Antenna Electrical Characteristics.

Figure 5. LSU Tower TLE Reconfiguration.



Timing. The North American LORAN-C system has an installed base of 101 HP-5071A primary cesium-beam frequency standards. LORAN-C is a Stratrum-1 Master Primary Reference Source for timing. Co-location should not degrade the precision time reference capability of the LORAN-C signal.

Communications. Although originally designed for navigation purposes, the LORAN-C system transmissions are an effective method of conducting long distance communications. The FAA is currently funding a USCG initiative to study the use of LORAN-C as a “high-speed” data channel for providing the 500-bps GPS Wide Area Augmentation System (WAAS) differential correction and data integrity messages especially in the high latitudes of Alaska. In this context, “high” speed is with respect to the speeds previously attainable using the LF LORAN signal. High-speed communication requires precision manipulation of the frequency of the LORAN-C signal within the pulse itself. Co-location must not deleteriously impact the capability of LORAN-C to provide WAAS messages.

age area with which the transmission will provide the desired level of navigation accuracy. The specification of peak-radiated power for LORAN-C transmitted signals varies depending on the application. Those stations presently operating in the United States have radiated power specifications ranging from 340 kW to as high as 1440 kW radiated peak power. The co-location effects must not significantly reduce the radiated power level, or any power level decreases must be mitigated through increasing the transmitted output power. Additionally, there should be no signal distortion effects (timing or frequency), on the local equipment cycle compensation loops that result in degraded navigation signals to the LORAN-C user community.

CO-LOCATION METHODOLOGY

The USCG LORAN Support Unit (LSU) in Wildwood, New Jersey, has a 625' TLM antenna that can be used for real world testing. Members of the DGPS RF NWG traveled to LSU to reconfigure

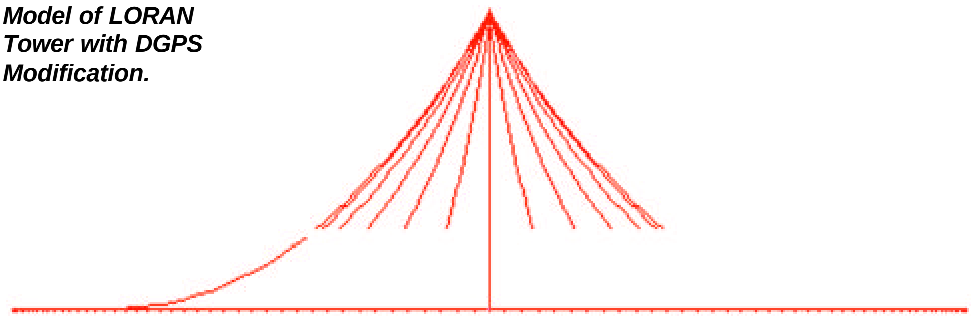


Figure 6. Computer Model of LORAN Tower with DGPS Modification.

Professor McKaughan and Cadet McCarter.

a TLE and collect data. Figure 5 shows how the guy portion of the TLE was changed and Alumoweld was inserted to replace the steel cable. Prior to this visit, the USCG Academy was working to model the LSU tower and the effect of altering the TLE. This model was analyzed using the powerful antenna modeling software GNEC. Figure 6 shows the graphical representation of the computer model that was generated.

The actual measured results closely approximated what the modeling predicted (Table 2). The real part (resistive) of the actual reading was different due to the model only included the LORAN antenna ground plane. The RF NWG members installed a 20 ft by 20 ft copper mesh with several ground rods and tied it to two of the LORAN antenna ground radials. This reduced the ground loss portion of the overall antenna resistance.

	Frequency	Impedance
Model	**300 kHz**	**45.8 - j420**
Actual	**295 kHz**	**18.25 - j480**

Table 2. Modeled Versus Actual Measurements at TLE.

Overall the values were very promising. While on site, the LORAN transmitter was energized and voltage measured and recorded at the feed point for the DGPS antenna. The induced LORAN RF was measured at approximately 16 kilo Volts (kV) peak-to-peak. DGPS reference stations and integrity monitors were set up and tested at a location not far from the base of the LORAN tower. While the transmitter was broadcasting, there seemed to be no significant impact on the ability of the receivers to track satellites or provide DGPS corrections. The receivers were connected to a data logging laptop computer and left at LSU to evaluate any GPS masking issues that may occur due to the LORAN tower structure obstructing the sky view. The equipment was recently returned to Command and Control C Engineering Center (C2CEN) and analysis of the data is pending.

A portable 100-watt DGPS transmitter was connected to the DGPS antenna using a Starlink CP3000 coupler. The coupler was tuned to match the antenna and the LORAN transmitter was energized. The 16 kV of induced LORAN RF had no effect on the DGPS coupler or transmitter. The procedure was repeated using a Southern Avionics coupler. Again the LORAN induced RF had no negative effects on the DGPS equipment. Based on previous experience, it was felt that the DGPS antenna in close proximity to the steel structure of the LORAN tower would cause significant distortion of the radiated pattern.[5] In some instances directionality is advantageous. For instance, the signal from sites located close to the Canadian border cannot interfere with the Canadian aero-beacons. By choosing the right

Proof-Of-Concept Test Location at the LORAN Support Unit (LSU).

TLE, the signal can be minimized or maximized in a given direction. The USCG Academy modeled the effects and the results are presented in Figure 7. A normal radiated pattern would extend equally in all directions discounting the effect of ground conductivity and terrain. The different colors in the figure indicate different take off angles measured from the ground towards the tower at which the radiation pattern has been measured. During the testing at LSU, an aircraft was contracted and DGPS field strength measuring equipment temporarily installed. The aircraft flew two circles around the LORAN tower, at a radius of two and ten miles. The field strength data is being analyzed and compared to the model predictions.

The concern with co-locating DGPS at LORAN stations has concentrated on finding any negative impacts of the high power LORAN transmitter of the DGPS signal. Since we saw none, we started to look at the effect of the DGPS signal on the LORAN operations. Discounting that the portable DGPS transmitter was limited to 100 watts; we saw no bearing on timing or pulse shape of the broadcast LORAN signal.

NEXT STEP

Although the on-air proof-of-concept testing was successful, some unanswered questions remain. What effect on the LORAN signal would occur if a 1000-watt DGPS transmitter were used? What effect of the polarization of the antenna leaning at an angle will have on the induced ground wave? How can the DGPS antenna be modified to maximize efficiency? How will the equipment hold up long term to the effect of the induced LORAN? To answer these questions, another test should occur. This test should be geared more toward a long-term field test vice proof-of-concept. Based on final results and lessons learned, the techniques developed will be used in the future to examine possible DGPS antenna configurations for the SLT and TIP tower LORAN-C stations. Developing a solution for SLT and TIP sites should not be as challenging since the tower structure at those sites is not energized as part of the LORAN antenna. There are several options available ranging from isolating the tower by jacking it up and installing a base insulator or simply attaching a folded monopole antenna to the structure and isolating it.

BENEFITS

Why bother with looking for a co-location solution? In addition to savings in actual construction costs,

LT Parsons and CWO Manley.

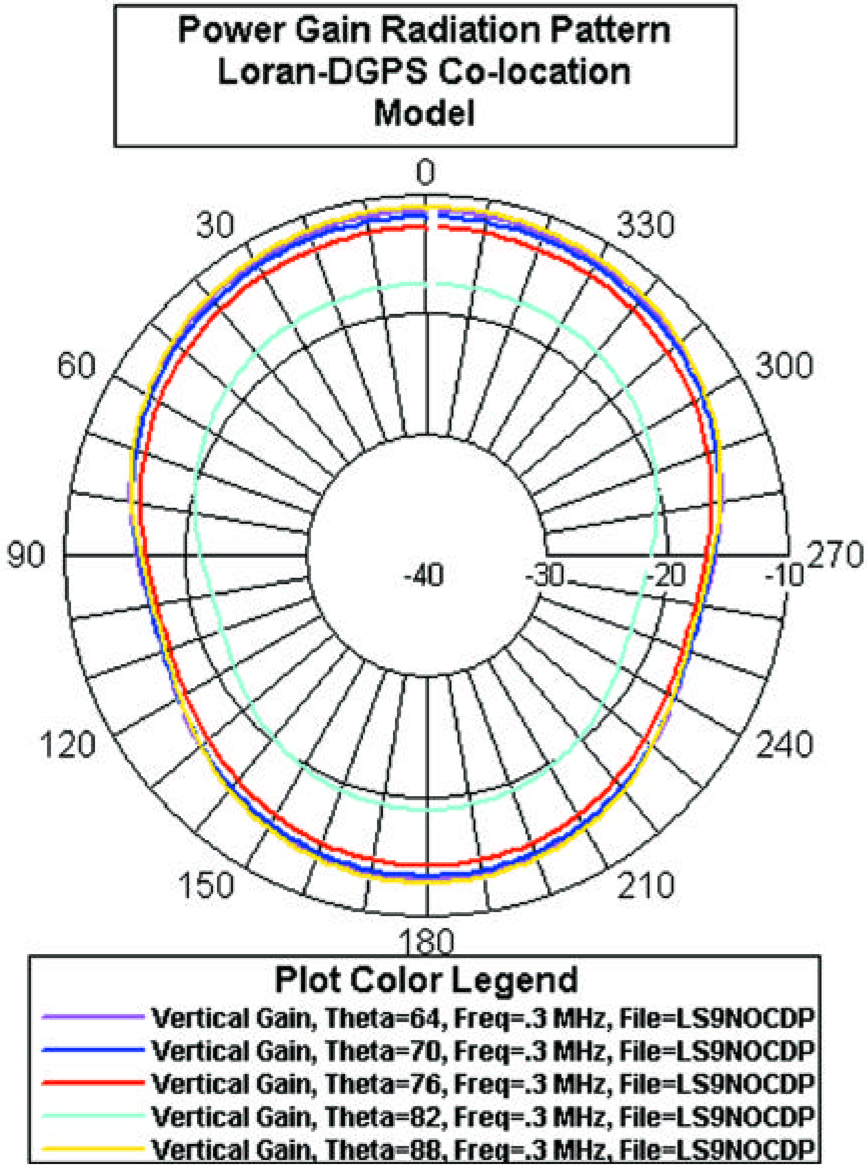


Figure 7. Theoretical Distortion of the Radiated Pattern of a Co-located LORAN and DGPS Antenna.

there would be a resulting savings in the project timeline. Two new NDGPS sites that were recently built took well over two years to go through the process from site selection to the beginning of actual construction. Once a potential site is selected, a site survey must take place to make sure the property is technically suitable as a DGPS site. The environmental history of the site must be researched as well as the future environmental impact of building the DGPS site must be investigated. Once all clearances occur, a lease must be negotiated with the landowner or government agency that owns the property. Modifying an existing LORAN-C tower to broadcast the DGPS signal would eliminate most, if not all, of this process.

Another benefit of co-location is the potential for increased signal availability. Currently when an unmanned DGPS site has an equipment failure, technicians must be dispatched to the site from locations very far away just to investigate the problem. In the current LORAN-C station model, USCG technicians already on-site could not only investigate any failures, they could periodically visually inspect the equipment to see if there are problems developing (coupler arcing, etc.). Having technicians on-site could not only prevent some failures, but also greatly reduce the downtime when an actual equipment failure occurs. If LORAN stations are un-manned, the recall time for technicians would still be much less in compared to dispatching a nationwide support contractor.

All benefits stated have even more importance when we discuss building NDGPS sites in Alaska. We expect that the labor and material costs in

Alaska are up to three times as much as they would be in the lower 48 states. The environmental and permitting process is expected to take one to two years longer than typically in the lower 48. The remoteness of the Alaskan sites provides additional maintenance challenges. By co-locating at the Alaskan LORAN stations, we could potentially reap in excess of one million dollars in savings per co-located site.

CONCLUSION

Co-location not only results in project (tax dollars) savings, it greatly reduces the timeline involved to get a new DGPS signal on air. In addition, having USCG technicians available on-site would increase the signal availability by providing a more rapid response if the equipment experiences a failure. Due to the many potential benefits, final testing and implementation plans should proceed further.

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Programming of Very High Frequency (VHF) Radios

The Coast Guard has been upgrading Very High Frequency (VHF) mobile and handheld transceivers over the past five years. This lead to the fleet wide transition from the MCX-1000 to the Astro Spectra for their VHF Mobile transceivers both afloat and ashore -- along with the fleet moving from the MX-300 VHF handheld transceiver to the Astro Saber 1R and the XTS-3000R. All of the new VHF radios are programmable radios and the Coast Guard loaded an original standard "codeplug" on all of them. Each Area and District is able to modify this standard at its own discretion using Motorola-supplied programming software.

The original programming software, Radio Service Software (RSS), was a DOS based application. While this hindered the speed and ease of programming radios, it did allow us to run the application from a floppy drive rather than loading it onto the C:\ drive. This allowed users to run the application on a Standard Workstation III without any configuration change requirement. It also allowed some users to continue using older laptops that had been provided for other applications.

Recently, Motorola upgraded the RSS software to a Windows-based application that is certified for all systems including Windows XP. The new software comes on CD-ROM in a CPS and Tuner package for both the Astro Spectra and the Astro Saber. The CPS is an exact port of the RSS without the ability to adjust the power levels. The Turner package includes ability to adjust power levels. However, both of these applications need access to the C:\ drive in order to run. For that reason they will no longer run on the Standard Workstation III and some older laptops.

The Telecommunication and Information Systems Command (TISCOM) is purchasing laptops for the Electronic Support Units and Detachments that currently have TISCOM-supported RSS software licenses. The new laptops will be used instead of Standard Workstation III and will be distributed with the new version of RSS software pre-installed on them.

LTJG Robert Salembier, TISCOM

The Future of HF Communications in the Coast Guard

by **LCDR Eric L. Bruner**
Office of Communications Systems (G-SCT)

Despite the installation of military and commercial satellite voice and data communication systems on many of our cutters and aircraft, High Frequency (HF) will remain a vital part of our long range communications architecture. However, it doesn't have to be a challenge to use. Several efforts are underway to make HF more reliable, more capable and easier to use.

The first big success in improving HF use was just implemented by LT Pete Van Ness and CWO Perry Sproul of the Telecommunication and Information Systems Command (TISCOM). LT Van Ness and CWO Sproul just completed replacing all of the Work station II based HF Data Link (HFDL) suites with new Work station III HF Data Exchange (HFDX) systems. Not only did this upgrade remove those lovable green screens from these cutters, but it significantly improved the system's through-put. As an example, the new HFDX system, as configured, can pass data at a rate of 2400 bts per second

(bps), which is leaps and bounds above the 300+ bps of the old HFDL. This higher data rate, along with other improvements in areas such as compression and error correcting, has virtually wiped out the back logs in the record message queues. The final configuration of HFDX will be capable of 9600 bps in Single Side Band (SSB) and 19.2 Kilobits per second (Kbps) in Independent Side Band (ISB). Since it's very difficult to obtain authorization to use ISB frequencies, there are no plans to use ISB at this time.

The next planned improvement is replacing all of the high maintenance GSB-900s and HF-80s in the Coast Guard with more reliable and capable HF systems. This year, TISCOM, the Maintenance and Logistics Command Atlantic (MLCLANT) and the Coast Guard YARD have been busy replacing the GSB-900s on all HFDX capable cutters with the SunAir RT-9000. These installations should be completed by the end of calendar year 2002. In 2003, the plan is to replace the GSB-900s on 210s, ALEX HALEY, STORIS, polar cutters and all groups. The remaining GSB-900s at other shore units will be replaced in 2004 and 2005. The GSB-900s on 378s will also be replaced in 2004 if they are not already scheduled for replacement by the Deepwater program. The HF-80s at the Communications Area Master Stations (CAMSs) and the Communications Stations (COMMSTAs) will be replaced with Rockwell Collins RT-2200 systems starting in 2003.

The primary purpose of this re-capitalization effort was to improve the reliability of the Coast Guard's HF assets. However, research into potential replacement systems revealed that HF has come a long way over the last 20 years and has benefited from the advances in technology and micro-computers. One particular advancement that is very promising, and exciting, is a system called Automatic Link Establishment (ALE). Although not a new concept, technology has made ALE implementation an attractive option. As a result, all new HF systems used for command and control will be ALE capable.

What is ALE? ALE is basically computerized frequency management. Instead of two human operators at either end trying to determine which frequency will work for the time of day, geographic separation, solar flare activity and much more, the computer does it. ALE processors in all HF receivers in a network are loaded with a list of common frequencies, usually 6-10 that span the HF spectrum, and the addresses of all network members. Through sounding (pinging) and listening, the ALE processor continually scans through the list of frequencies and keeps track of the radio quality of the link it has with every other network member, called a Link Quality Analysis (LQA) table. Table 1 is a fictitious example of a LQA table for CGC JUNIPER.

When station 1, for example Coast Guard Cutter (CGC) JUNIPER, is ready to call station 2, for example Group Key West, JUNIPER would find Group Key West's (GKW) ALE address in the radio and initiate the call with the push of a button. JUNIPER's ALE processor would refer to its LQA table and select the frequency with the best recorded link quality for Group Key West, which, in this case, would be 18,000 KHz with an LQA of 47. JUNIPER's ALE processor would then attempt to call Group Key West on that frequency via a short data burst ("GKW this is B01"). Group Key West's ALE processor will answer if it hears JUNIPER. If not, or if the reply is too weak for a quality link, JUNIPER's ALE processor will try the frequency

Frequency Scan List	Unit ALE Address						
	J03	**F04**	**P09**	**M13**	**H16**	**GKW**	**SVA**
2,000	20	15	18	35	20	42	16
4,000	42	29	44	30	49	36	25
6,000	12	38	40	28	31	32	22
8,000	4	22	25	42	20	28	35
10,000	36	11	30	12	19	17	48
12,000	28	9	16	22	38	30	10
14,000	19	47	33	45	16	44	44
18,000	45	33	28	13	25	47	12
22,000	22	42	9	32	29	29	20
28,000	39	18	30	21	32	15	14

Scale: 0 = worst, 50 = best

ALE Address Legend
J03 = Jayhawk (CG6003)
F04 = Falcon (CG2104)
P09 = CGC AQUIDNECK (WPB 1309)
M13 = CGC MOHAWK (WMEC 913)
H16 = CGC DALLAS (WHEC 716)
GKW = Group Key West
SVA = SVN CAMS Atlantic

Self ALE Address
B01 = CGC JUNIPER (WLB 201)

Table 1. Example of Link Quality Analysis Table for Coast Guard Cutter JUNIPER (WLB 201).

with the next best link quality rating, which, in the case above, would be 14,000KHz with an LQA of 44. This continues until the ALE processors find a frequency that works. If the frequency scan list is diverse enough, the chances of finding a frequency that will work are high. Once the ALE processors make that link, the processors notify their operators (at both ends) with a tone or "ring," to let them know they have a link. At this point, the radio is used like a traditional HF radio, using normal call signs and encryption as desired. Figure 1 shows a simplified picture of this process. When the conversation is over, the radios are returned to scan so they are ready to receive another call.

The most challenging thing about communicating via HF is proper frequency management. To achieve reliable voice or data communications over HF, all operators need training and years of experience to understand and compensate for the numerous variables that must be considered. Although our Telecommunications Specialists (TCs) do an admirable job of making that HF connection, it's a lot of work for them. For the units that don't have TCs, it's even more of a challenge and more work to obtain a reliable HF channel. Shifting frequency management to an automated system will improve the reliability of HF communications and reduce the need to teach everyone the theory of HF propagation. Many other agencies have gone to ALE for HF communications including U.S. Customs, Department of Defense (DoD), Federal Bureau of Investigation (FBI) and Federal Emergency Management Agency (FEMA).

So, how can we use ALE in the Coast Guard? Coast Guard Headquarters Office of Communications Systems (G-SCT) has chartered a Matrix Product Team (MPT) to look into that question. The team is made up of representatives from the Areas, MLCs, TISCOM, several headquarters offices, Research and Development (R&D) Center, CAMS, COMMSTA Kodiak and several field units already experimenting with ALE like District Seven(dt), Group Key West and Helicopter Interdiction Tactical Squadron (HITRON). To date, the HF ALE MPT has determined that ALE could be applied to the HFDX system as well as all intra-Coast Guard HF voice communications.

Adding ALE to the HFDX system promises to turn a very capable record message transfer system into a critical tool for operational, administrative and moral purposes. By adding ALE to the system, the first benefit is a significant improvement in HF communications reliability. No longer will the CAMS and cutter personnel need to spend time finding the right frequency to make a quality link. Once the traffic is queued, the HFDX will take control of the radio and instruct the ALE processor to make a link. When the link is established, the HFDX will pass the traffic. This process will significantly reduce the amount of manual intervention required to send and receive traffic, which will be particularly beneficial to

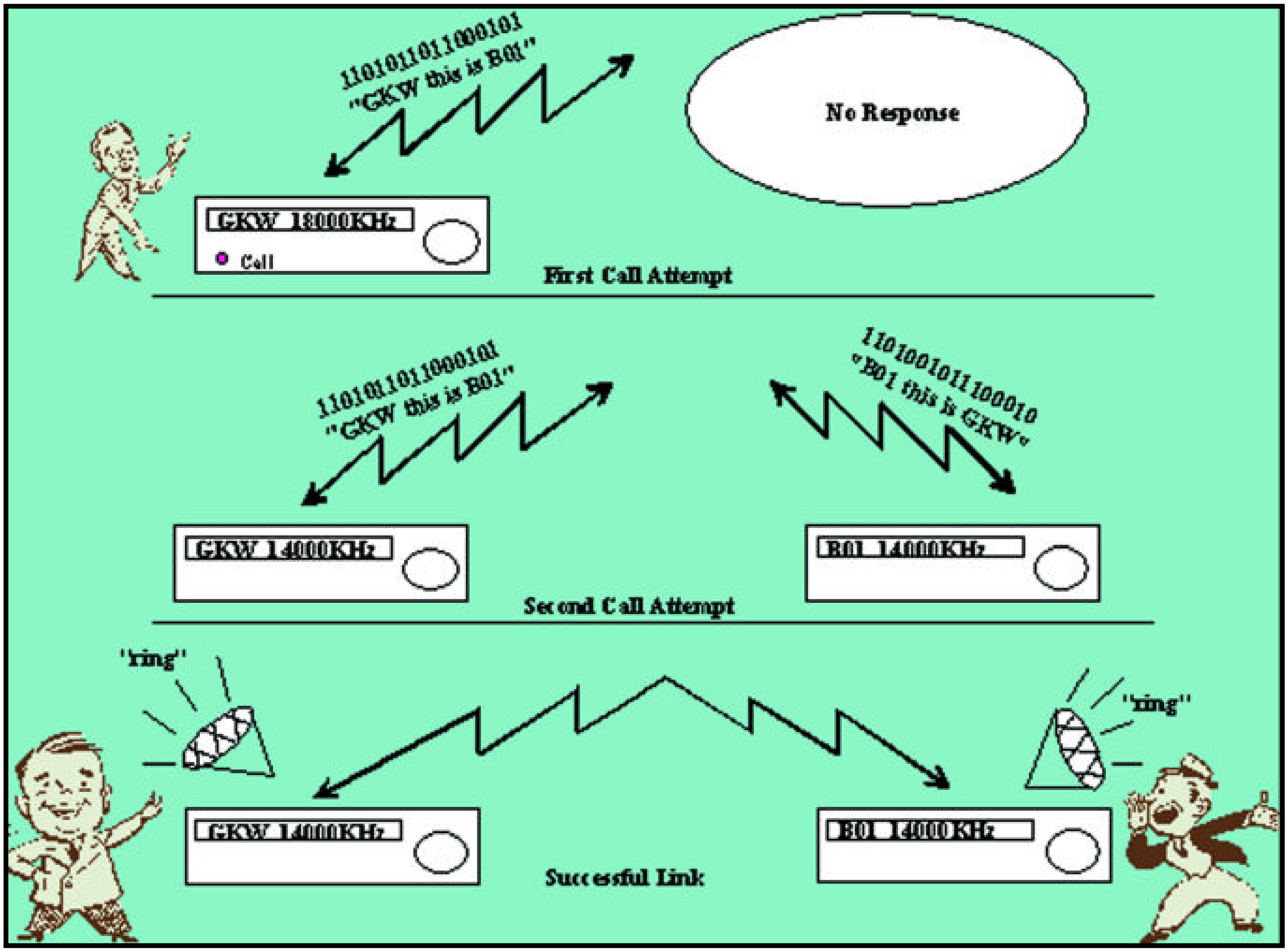


Figure1. Simplified Example of a Link Establishment.

the smaller cutters who do not have a 24x7 radio watch.

The current plan for the Coast Guard long range wireless data communications architecture is to transmit the classified and unclassified information over two different "pipes." Commercial satellite (INMARSAT B or Mini-M) would be used for the classified information, and HFDX would be used for unclassified traffic. This would allow the HFDX system to be connected to the on board Local Area Newtwork (LAN) and could be used for other data transfers, like e-mail. Also, the data exchange would no longer be limited to cutter to shore communications. With automated frequency management, the data exchange can be used between any two HFDX-ALE capable units: cutter-aircraft, cutter-cutter, aircraft-shore, etc. TISCOM's LT Van Ness and CWO Sproul instituted the first Coast Guard HF ALE data network in District 9 (D9) during the summer of 2002.

But wait, there's more! The U.S. Customs Service has been working with Rockwell Collins in developing a system they are referring to as "HF Cellular." Basically, it is linking all the ground ALE transmitter/receiver stations together via a master control computer, and letting the ground station that has the best link with the mobile unit take the call. This concept gives an HF network geographic diversity, which, combined with the frequency diversity of ALE, can significantly improve the networks link reliability. For the Coast Guard, this would mean linking all HFDX transmitter/receivers at all of the CAMS and COMMSTAs together to one control computer. When a cutter has traffic to pass, the station that has the best link would take the traffic. This could mean a cutter (or aircraft) in the Caribbean could link up with a CAMSPAC (Pacific) HFDX suite.

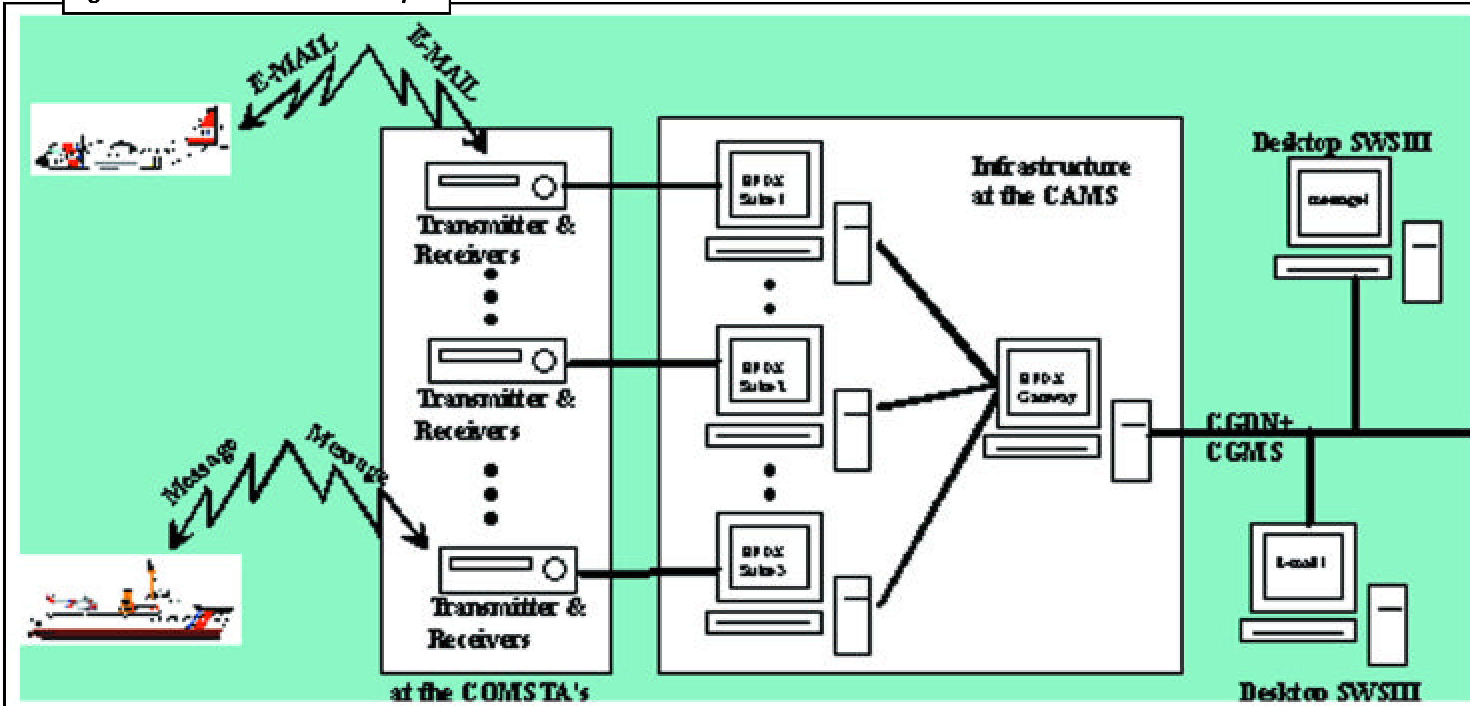
Not only does this concept promise to increase link reliability, but it could be engineered to make the

HFDX system into an automated gateway for e-mail and message traffic. A message or e-mail from shore (e.g., a person's desk) would be sent to the master control computer, which would direct a station to link with the receiving mobile unit. Once the link is established, the master control computer would send the data to the proper HFDX suite for transmission. Similarly, a mobile unit's HFDX could initiate a call to shore, a link would be established with the best station and the data would be passed to the shore HFDX suite and automatically to the CGMS or CGDN+ (Coast Guard Data Network Plus) system. Figure 2 is a simplified example of the possible architecture of this HF gateway concept.

There are similarly exciting possibilities for HF ALE voice communications between Coast Guard units. The first gain is removing the person out of frequency management, and letting the computer choose the frequency that will compensate for all of the environmental factors. Basically, Coast Guard HF voice communications would go from using the same two or three frequencies, to always taking advantage of 10 frequencies. This will go a long way to making HF a reliable path for voice communications, especially for critical traffic like flight following information. The HF ALE MPT is currently working on how ALE voice networks should be set up. More than likely, each district will start with its own ALE voice net with the idea that the whole Coast Guard would shift to a national HF ALE voice net, like Customs' COTHEN system. These details are being worked out, but it appears the “HF Cellular” concept would also be used for this national network. LCDR Dermanelian of D7(dt (communications)), TCC Taylor of Group Key West, CPO Dunn and PO Dewey of Air Station Clearwater, LT Waller of OPBAT and LT McCullars of Aviation Training Center (ATC) Mobile have been very proactive in testing ALE for tactical communications. Their efforts will provide valuable input into the final ALE architecture.

Although proper frequency management is a very large part of making HF communications more reliable, there are other factors to consider too, such as antennas. There are several on going efforts throughout the Coast Guard to review and improve our HF antenna inventory. The CAMS have been working on re-capitalizing their antennas, and the MLCs, the Electronic Systems Support Units (ESUs) and the districts have been reviewing their inventory and placement of shore and cutter antennas. LCDR Dermanelian, working closely with ESU Miami, has been testing a new Near Vertical

Figure 2. HF “Cellular” Example.



Incident Sky Wave (NVIS) antenna in the D7 Area of Responsibility (AOR). This antenna basically radiates straight up, which causes the HF waves to bounce almost straight back down. The result is excellent HF coverage within 300 miles, which is the area outside of VHF range, but inside the skip zone of typical whip antennas. Test results so far indicate this NVIS antenna is an excellent tool for short range HF.

For the capital cutters (210' and above), Mr. James Brown at TISCOM is investigating a replacement antenna for the mini-loop. The mini-loop has become too expensive to support and requires to much operator training to be a useful HF antenna. Mr. Brown contracted with ARINC to study various other types of antennas to install in place of the mini-loops. The analysis is not limited to whips, nor is it limited to installing the new antenna at the same location as the mini-loop. PACAREA(Pt) (Pacific Area (Command, Control and Communications Division)) recently prototyped whip antennas in place of the mini-loops on ACUSHNET and POLAR SEA with great success. As a result, they are looking into doing similar replacements on STORIS and POLAR STAR.

For the smaller cutters, primarily patrol boats, LCDR Dermanelian, Mr. Mark Roebuck and Mr. Neal Parker at MLCLANT, along with Professor Mike McKaughan at the USCG Academy are partnering to see what can be done to improve their HF transmission and reception.

As you can see, a lot of effort is going into improving the Coast Guard's HF infrastructure and how we use it. Even though satellite communications offer very reliable and high-speed communications, there will always be a need for HF communications between Coast Guard units. After embracing the fact that HF will be around for the long run, it only makes sense to take advantage of the technological advances that occurred over the last 20 years, and make using HF easier and more reliable. For more information on these efforts, please feel free to contact LCDR Eric Bruner at COMDT(G-SCT-1). ST

Next-Generation MF and MF/HF Digital Selective Calling (DSC) System

by Jimmy Lee
Telecommunication and Information Systems Command

The present Workstation II-based, Medium Frequency (MF) Digital Selective Calling (DSC) and the MF/HF DSC systems will be replaced with a new PC-based system. This will be accomplished in two phases.

Phase I: The first phase will be to replace the present installed systems with a Commercial-Off-The-Shelf (COTS) solution. The COTS system is to provide the same capabilities as the Workstation II-based system. The system will be based on the Windows NT operating system. The system will not take any more space or power than the existing system. The system will use the existing receive and transmit antenna and transmitters. All the X.25 equipment at the Communications Area Master Station (CAMS) and Communications Stations (COMMSTAs) will be eliminated.

Phase II: Phase II will add additional capabilities to the DSC system. These include:

- Networking of DSC systems with their associated Remote Communications Consoles (RCCs) to allow electronic notification to RCC that the Group/CAMS/COMMSTA has received a DSC distress call.
- Interface to the Command and Control Personal Computer (C2PC) system to display position data of DSC distress calls.
- Database sorting.

Continued from Page 51.

- Duplicate distress call sorting.
- DSC calling directory.
- Automated report generation capabilities.

Status: There is an approved Resource Proposal (RP) in place for this effort. The Office of Search and Rescue (G-OPR) is the program sponsor and submitted the RP. G-OPR also developed an Operational Requirements Document (ORD) for the replacement system. The Office of Communications Systems (G-SCT) is the Headquarters program manager. The Telecommunication and Information Systems Command (TISCOM) is executing the project and submitted a procurement package to the Office of Contract Support (G-ACS) based on the ORD. G-ACS released a pre-solicitation notice to industry on 21 June 2002, informing industry of the Coast Guard's intent on procuring a DSC system. The actual solicitation was released on 9 July 2002. Responses from industry were received on-or-about 6 August 2002. Assuming the contracting cycle goes smoothly, we can expect to see the first system fielded by early next calendar year. The priorities for installations will be the MF/HF systems at the CAMS/COMMSTAs, followed by the MF systems at the Groups. No priorities have been established beyond that. The plan is to minimize interruptions to DSC coverage while the installations are being performed.

New High Power High Frequency Transmitters

by LTJG Rob Salembier
Telecommunication and Information Systems Command

RT-2200 Receiver Exciter.

The Coast Guard has been operating many of its High Power High Frequency (HF) transmitters for over 25 years. These transmitters are both technologically outdated and difficult to support. In Fiscal Year 2002 (FY02) an Office of Communications Systems (G-SCT) sponsored Resource Proposal (RP) was funded to begin replacing the Coast Guard's aging high-power HF transmitters.

The Telecommunication and Information Systems Command (TISCOM) is spearheading the High Frequency Recapitalization process. Sixteen new 4 kW High Frequency transmitter systems were purchased. The plan is to initially install three of them at Communications Area Master Stations Atlantic and Pacific (CAMSLANT and CAMSPAC) and two each at Communications Stations (COMMSTAs) Boston, Miami, New Orleans, Honolulu and Kodiak. These initial transmitters will be used to add Automatic Link Establishment (ALE) to the High Frequency Data Link (HFDX) system. They will also be used to test ALE for other missions (e.g., air/ground and ship/shore voice). In following years, we will continue to replace the aging Rockwell Collins 10 kW HF-80s throughout the fleet.

The new 4-kW High Frequency system consists of two components, an RT-2200 Receiver Exciter and an PA-2224 4-kW Power Amplifier. This system will operate in a “split-site” scenario in the same fashion that both the CAMS and COMMSTAs operate currently. The RT-2200 is a solid state receiver exciter that operates from 1.5 to 29.9 MHz, in Upper Side Band (USB), Lower Side Band (LSB), Independent Side Band (ISB), Continuous Wave (CW), Amplitude Modulation (AM) and Frequency Shift Keying (FSK) modes, and meets both MIL-STD-188-141B (Military Standard) and FED-STD-1045A (Federal Standard) Automatic Link Establishment (ALE) requirements. It fits in a standard 19 inch rack and meets all Coast Guard environmental requirements. The United Stated Air Force (USAF) Scope Command has been using this equipment for the past five years. The equipment has

proven extremely reliable for the USAF, with a measured Mean Time Between Failure of about ten times the published one of 9,000 hours.

The Coast Guard contracted with Rockwell Collins as consultants to help develop an ALE data network and an ALE voice network using these systems along with the Sunair RT-9000A systems being installed on cutters and at Groups. Implementation of these new transmitter systems will allow the Coast Guard to move into the future using ALE first for data communication, and then expanding the system to include voice communication.

PA-2224 4-kW Power Amp.

HF Radio Data Network Prototype

by LT Pete Van Ness
Telecommunications and Information Systems Command (TSD-3)

High Frequency Data Exchange Network with Automatic Link Establishment (HFDX/ALE)

TISCOM (Telecommunication and Information Systems Command) has established a prototype radio network in District Nine (D9) to design, test and evaluate the plans for a Coast Guard wide HFDX ALE Data Network. This prototype will help refine system designs and network architecture for the final phase of the small cutter connectivity migration from High Frequency Data Link (HFDL) to unclassified High Frequency Data Exchange (HFDX) and classified Satellite Data Exchange (SDX). The ALE data network installation in District Nine was completed in August 2002. District Nine was chosen as the ideal setting for the ALE data network prototype for several reasons. A majority of the cutters in District Nine have already been outfitted with the new RT-9000 HF Transceivers and they are not currently part of Communications Area Master Station Atlantic's (CAMSLANT's) HFDX message guard (D9 message delivery was provided through cellular e-mail). Additionally, a classified HFDL delivery system was not in operation and TISCOM was able to install unclassified HFDX suites to test ALE functionality and architecture. Twelve units in a central locality (D9) are providing excellent test results for the automated HFDX using HF ALE. Units participating in the prototype include Group Detroit, Group Sault Ste. Marie, District Nine Communications Center, U.S. Coast Guard Cutters (USCGC) BRAMBLE, ACACIA, SUNDEW, MACKINAW, BISCAYNE BAY, KATMAI BAY, MOBILE BAY, NEAH BAY and BRISTOL BAY. In addition to the establishment of an ALE network, updated versions of the Rockwell Collins HF Messenger software were installed on each unit. The ALE data network is already demonstrating significant improvements in connectivity and will greatly reduce the frequency management burden on all communication station and cutter operators.

The HFDX ALE prototype is funded through TISCOM's Commercial Satellite Communications Project (RCP 99-300) as a recapitalization of the High Frequency Data Link (HFDL) system aboard all HFDL dependent cutters. A DELL Power Edge 2400 Server running MS (MicroSoft) NT Workstation 4.0 and Rockwell Collins HF Messenger Software, a Rockwell Collins Q9600 High Speed Data Modem, a SunAir RT-9000 125W HF Transceiver, and a KIV-7HSB encryption was determined by TISCOM to be the most cost effective and dependable communications suite to replace the legacy HFDL system. The Commercial Satellite

Communications (ComSatCom) Executive Steering Group (ESG), under the Office of Communications Systems (G-SCT) and the Office of Cutter Forces (G-OCU), approved the HFDX system and the implementation of an HF ALE Data network. The ESG released the funding to TISCOM to prototype and field the proposed HFDX system. All HFDL units outside D9 have already received a stand-alone classified version of HFDX during the first phase of the replacement project (March 2001 to April 2002). The CAMSs and Communication Stations (COMMSTAs) have experienced significant improvements in speed of service and link reliability utilizing the new HFDX suites. However, operator intensive frequency management between the cutters and CAMSs still remains a challenge for the current HFDX system. In an effort to replace the aging GSB-900 HF transceivers and provide more automated systems, cutters are currently under going RT-9000 Transceiver upgrades to providing new, higher powered, more reliable HF communications with ALE capabilities for voice and data. Several high powered HF ALE transmitters were recently purchased for the CAMSs and COMMSTAs with installations scheduled to begin second quarter of Fiscal Year 2003 (FY03). Once all HFDX cutters and all shore side transmitter sites have ALE capabilities, we will be able to establish a Coast Guard (CG) wide HF data network. Additionally, all HFDX units will eventually receive a satellite based classified messaging suite utilizing INMARSAT Mini-M systems. When the satellite system is in place, the shipboard HFDX systems will be down graded to handle Encrypted For Transmission Only (EFTO)/UNCLAS message traffic and integrated with the cutter's CG Standard Workstation III local area network. District Nine units will also receive the classified messaging system using a dial-up circuit over satellite within the next year.

The HFDX ALE network prototype consists of three shore based network connection stations at Group Detroit, Group Sault Ste. Marie and District Nine in Cleveland. Each shore side HFDX Suite is connected to the CGMSD9 Exchange Server and the D9CuttersEX E-mail Exchange Server via Coast Guard Data Network Plus (CGDN+). Coast Guard Message System (CGMS) Messages are dual-routed from the CGMSD9 server to the cutter's shore side account and to the HFDX suite at one of the shore side locations. Using ALE, the HFDX shore location attempts to deliver the messages to the cutters a finite number of times. If all attempts are unsuccessful, the message is forwarded to the next shore station and the process is repeated from a different geographic location. Individual cutters act as mobile nodes on the network and may send and receive traffic with any of the three shore side stations. The cutter does not need to know which station is providing their connection to the network. The HFDX system proposal also calls for administrative e-mail to be routed over CGDN+ to the shore side HFDX suites for delivery to cutters underway. Configuration of the shipboard and D9cuttersEX MS Exchange Servers to handle in port and underway e-mail delivery is currently under development.

The HFDX ALE network prototype has also successfully replaced KG-84C encryption units with KIV-7HSB encryption units. The KIV-7s are proving to be highly reliable and much easier to use than the legacy KG-84s. A Rockwell RT-2200 HF ALE transceiver was installed at Group Sault Ste. Marie to evaluate is capabilities in comparison with the current SunAir RT-9000s. A Near Vertical Incident Skywave (NVIS) antenna was also installed at Group Sault Ste. Marie. The NVIS antenna improved HF coverage of the Great Lakes exponentially and has allowed Group Sault Ste. Marie to provide ALE network connectivity to all District Nine cutters. TISCOM anticipates a successful completion of the prototype this fall, followed by installation of upgraded software and modems, and replacement of the KG-84Cs with KIV-7 encryption devices on all HFDX units. Implementation of e-mail connectivity for underway units over an HF ALE network is still in development and full implementation of a CG wide HF ALE network is still at least a year in the future, but the District Nine prototype and tremendous input and cooperation of District Nine units has enabled TISCOM to make significant advances in HF ALE network design and implementation.

Defense Information Systems

On 8 April 2002, four Coast Guard individuals and two teams were recognized by the Defense Information Systems Agency (DISA) at the Annual Defense Message System (DMS) Users Conference in San Diego. Individuals and teams were recognized for their significant progress towards implementation of DMS in the Coast Guard. Plaques were presented to the award winners by LCDR Steve Wolf, Coast Guard DMS Program Manager. Awardees from left to right were: CWO Mike Wilson (TISCOM), CWO Rudy McGwin (CAMSLANT), TC2 Charles Thearle (CAMSLANT), TCC Thomas Buccowich (CAMSPAC), TC1 Rhy Payne (CAMSPAC), and TC2 Ian Thurston (CAMSPAC).

Agency Honors Coasties

White House Closing the Circle Award

"Stewardship is the calling of government, and it is the calling of every citizen."

~ President George W. Bush, April 18, 2002 ~

From left to right: VADM Thomas Barrett, Vice Commandant; Mr. John L. Howard, Jr., Federal Environmental Executive; LCDR Don LaChance, ISC Kodiak; and CWO Jay Menze, ISC Kodiak (LaChance and Menze accepted the award for the environmental team).

The White House Closing the Circle Award is part of Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition." Integrated Support Command (ISC) Kodiak's team won the award as a model facility for their pollution/waste prevention, affirmative procurement, conservation and environmental education work. Bravo Zulu to ISC Kodiak!

U.S. Department
of Transportation

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Standard Distribution List 139

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A	8	5	5		8	5	2	5	2	1		1	3	2	2	1	1		1		2					
B		8	*	2	30	20	2	20	20	3	20	4	30	12	15	30	2	20	20	6	5	8	2	2	50	8
C	4	3		4	3	4	4		2	1	4	2	2	2	2		2	1	1	1		2*	1	3	1	1
D	2	1	2	3	2	2	1	1	1	1	1	2	1		1	1		1	2	3	1	2	1			2
E	1		1	1			4	3					1	1	1				1	1		2	1			
F																	1		1							
G	1	1	1	1																						

*B:c: MLCs (26), Districts (20)
Cv: Seneca (1)